Fishery Management Report No. 12-33

Fishery Management Report for Sport Fisheries in the Northwest/North Slope Management Area, 2010

by

Brendan Scanlon

September 2012

Alaska Department of Fish and Game **Divisions of Sport Fish and Commercial Fisheries**

Symbols and Abbreviations

The following symbols and abbreviations, and others approved for the Système International d'Unités (SI), are used without definition in the following reports by the Divisions of Sport Fish and of Commercial Fisheries: Fishery Manuscripts, Fishery Data Series Reports, Fishery Management Reports, and Special Publications. All others, including deviations from definitions listed below, are noted in the text at first mention, as well as in the titles or footnotes of tables, and in figure or figure captions.

Weights and measures (metric)

centimeter	cm
deciliter	dL
gram	g
hectare	ha
kilogram	kg
kilometer	km
liter	L
meter	m
milliliter	mL
millimeter	mm

Weights and measures (English)

cubic feet per second	ft^3/s
foot	ft
gallon	gal
inch	in
mile	mi
nautical mile	nmi
ounce	oz
pound	lb
quart	qt
yard	yd

Time and temperature

day	d
degrees Celsius	°C
degrees Fahrenheit	°F
degrees kelvin	K
hour	h
minute	min
second	s

Physics and chemistry

all atomic symbols	
alternating current	AC
ampere	A
calorie	cal
direct current	DC
hertz	Hz
horsepower	hp
hydrogen ion activity (negative log of)	pH
parts per million	ppm
parts per thousand	ppt, ‰
volts	V
watts	W

General

Alaska Administrative Code	AAC
all commonly accepted abbreviations	e.g., Mr., Mrs., AM, PM, etc.
all commonly accepted professional titles	e.g., Dr., Ph.D., R.N., etc.
at	@
compass directions:	
east	E
north	N
south	S
west	W
copyright	©
corporate suffixes:	
Company	Co.
Corporation	Corp.
Incorporated	Inc.
Limited	Ltd.
District of Columbia	D.C.
et alii (and others)	et al.
et cetera (and so forth)	etc.
exempli gratia (for example)	e.g.
Federal Information Code	FIC
id est (that is)	i.e.
latitude or longitude	lat. or long.
monetary symbols (U.S.)	$, ¢
months (tables and figures): first three letters	Jan,...,Dec
registered trademark	®
trademark	™
United States (adjective)	U.S.
United States of America (noun)	USA
U.S.C.	United States Code
U.S. state	use two-letter abbreviations (e.g., AK, WA)

Measures (fisheries)

fork length	FL
mideye-to-fork	MEF
mideye-to-tail-fork	METF
standard length	SL
total length	TL

Mathematics, statistics

all standard mathematical signs, symbols and abbreviations	
alternate hypothesis	H_A
base of natural logarithm	*e*
catch per unit effort	CPUE
coefficient of variation	CV
common test statistics	(F, t, χ^2, etc.)
confidence interval	CI
correlation coefficient (multiple)	R
correlation coefficient (simple)	r
covariance	cov
degree (angular)	°
degrees of freedom	df
expected value	*E*
greater than	>
greater than or equal to	≥
harvest per unit effort	HPUE
less than	<
less than or equal to	≤
logarithm (natural)	ln
logarithm (base 10)	log
logarithm (specify base)	$\log_2$, etc.
minute (angular)	'
not significant	NS
null hypothesis	H_O
percent	%
probability	P
probability of a type I error (rejection of the null hypothesis when true)	α
probability of a type II error (acceptance of the null hypothesis when false)	β
second (angular)	"
standard deviation	SD
standard error	SE
variance	
population	Var
sample	var

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FISHERY MANAGEMENT REPORT FOR SPORT FISHERIES IN THE NORTHWEST/NORTH SLOPE MANAGEMENT AREA, 2010

by

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The Fishery Management Reports series was established in 1989 by the Division of Sport Fish for the publication of an overview of management activities and goals in a specific geographic area, and became a joint divisional series in 2004 with the Division of Commercial Fisheries. Fishery Management Reports are intended for fishery and other technical professionals, as well as lay persons. Fishery Management Reports are available through the Alaska State Library and on the Internet: http://www.adfg.alaska.gov/sf/publications/. This publication has undergone regional peer review.

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ABSTRACT

Sport fisheries season summaries for 2010 and preliminary information for 2011 in the Northwest/North Slope Management Area are presented. The Northwest/North Slope Management Area (NW/NSMA) consists of all waters north of the Yukon River drainage in Norton Sound, the Seward Peninsula, Kotzebue Sound (including the major drainages of the Kobuk and Noatak rivers), and all north-draining waters of the Brooks Range east to the Canadian border. Sport and subsistence fisheries target king, coho, chum, and pink salmon, Dolly Varden, sheefish, Arctic grayling, and northern pike. In 2010, angler-days totaled 18,464 with the largest proportion coming from the Dalton Highway roadside fisheries (0.19). Coho salmon was the predominant sport species harvested in 2010 with 5,876 fish taken followed by pink salmon (2,712) and Dolly Varden (2,551). Summaries of major sport, commercial, and subsistence fisheries within the NW/NSMA are detailed, including descriptions of recent performances, Alaska Board of Fisheries regulatory actions, social and biological issues, and descriptions of ongoing research and management activities.

Key Words: Northwest Alaska, Norton Sound, Kotzebue, Unalakleet, North Slope, sport fisheries, subsistence, king salmon, coho salmon, pink salmon, Arctic grayling, Dolly Varden, sheefish.

EXECUTIVE SUMMARY

This document provides a wide array of information specific to the recreational angling opportunities and subsistence and commercial fisheries that exist within the Northwest/North Slope Management Area. Information specific to the recreational, subsistence and commercial fisheries within the Northwest/North Slope during 2010 and preliminary data from 2011 are presented along with a brief history of these fisheries and past Alaska Board of Fisheries (BOF) decisions that have affected them.

INTRODUCTION

This area management report provides information regarding the Northwest/North Slope Management Area (NW/NSMA) and is one in a series of reports annually updating fisheries management information within Region III. The report is provided for the Alaska Board of Fisheries (BOF), Fish and Game Advisory Committees (ACs), the general public, and other interested parties. It presents fisheries assessment information and the management strategies that are developed from that information. In addition, this report includes a description of the fisheries regulatory process, the geographic, administrative, and regulatory boundaries, funding sources, and other information concerning Division of Sport Fish management programs within the area.

The goals of the Division of Sport Fish of the Alaska Department of Fish and Game (ADF&G) are to protect and improve the state's recreational fisheries resources by managing for sustainable yield of wild stocks of sport fish, providing diverse recreational fishing opportunities, and providing information to assist the BOF in optimizing social and economic benefits from recreational fisheries. In order to implement these goals the division has in place a fisheries management process.

A regional review is conducted annually during which the status of important area fisheries is considered and research needs are identified. Fisheries stock assessment projects are developed, scheduled, and implemented to meet information needs identified by fisheries managers. Projects are planned within a formal operational planning process. Biological information gathered from these research projects is combined with effort information and input from user

groups to assess the need for and development of fisheries management plans, and to propose regulatory strategies.

Division of Sport Fish (SF) management and research activities are funded by ADF&G and Federal Aid in Fisheries Restoration funds. ADF&G funds are derived from the sale of state fishing licenses. Federal aid funds are derived from federal taxes on fishing tackle and equipment established by the Federal Aid in Sport Fish Restoration Act (also referred to as the Dingell-Johnson Act or D-J Act). The D-J funds are provided to the states at a match of up to 3-to-1 with the ADF&G funds. Additional funding specified for providing, protecting, and managing access to fish and game is provided through a tax on boat gas and equipment established by the Wallop-Breaux (W-B) Act. Other peripheral funding sources may include contracts with various government agencies and the private sector.

This area management report provides information regarding the NW/NSMA and its fisheries for 2010, with preliminary information from the 2011 season. This report is organized into 2 primary sections: a management area overview including a description of the management area and a summary of effort, harvest, and catch for the area, and a section on the significant area fisheries including specific harvest and catch by species and drainage.

The BOF divides the state into 18 regulatory areas to organize the sport fishing regulatory system by drainage and fishery. These areas (different from regional management areas) are described in Title 5 of the Alaska Administrative Code Chapters 47–74. The Division of Sport Fish of ADF&G divides the state into 3 administrative regions with boundaries roughly corresponding to groups of the BOF regulatory areas. Region I covers Southeast Alaska (the Southeast Alaska regulatory area). Region II covers portions of Southcentral and Southwest Alaska (including the Prince William Sound, Kenai Peninsula, Kenai River Drainage, Cook Inlet-Resurrection Bay Saltwater, Anchorage Bowl Drainages, Knik Arm Drainages, Susitna River Drainage, West Cook Inlet, Kodiak, Bristol Bay, and the Alaska Peninsula and Aleutian Islands regulatory areas). Region III includes Upper Copper River and Upper Susitna River area and the Arctic-Yukon-Kuskokwim Region (including the North Slope, Northwestern, Yukon River, Tanana River, Kuskokwim-Goodnews regulatory areas).

Region III is the largest geographic region, encompassing the majority of the landmass of the state of Alaska (Figure 1). The region contains over 442,500 mi^2 (1,146,000 km^2) of land, some of the state's largest river systems (Yukon, Kuskokwim, Colville, Noatak, Upper Copper, and Upper Susitna River drainages), thousands of lakes, thousands of miles of coastline, and streams. Regional coastline boundaries extend from Cape Newenham in the southwest, around all of western, northwestern, and northern Alaska to the Canadian border on the Arctic Ocean. Region III as a whole is very sparsely populated, with the most densely populated center located in the Tanana River Valley. Fairbanks (population about 35,000, Fairbanks North Star Borough population of about 99,000) is the largest community.

For administrative purposes Division of Sport Fish has divided Region III into 5 fisheries management areas (Figure 1). They are:

- Northwestern/North Slope Management Area (Norton Sound, Seward Peninsula, Kotzebue Sound, and North Slope drainages);
- Yukon Management Area (the Yukon River drainage except for the Tanana River drainage);

- Upper Copper/Upper Susitna Management Area (the Copper River drainage upstream of Canyon Creek and Haley Creek, and the Susitna River drainage above the Oshetna River);
- Tanana River Management Area (the Tanana River drainage); and,
- Kuskokwim Management Area (the entire Kuskokwim River drainage and Kuskokwim Bay drainages).

Area management biologists for the 5 areas are located in Nome/Fairbanks, Fairbanks, Glennallen, Fairbanks/Delta Junction, and Bethel/Fairbanks, respectively.

ALASKA BOARD OF FISHERIES

The BOF is a 7-member board that sets fishery regulations and harvest levels, allocates fishery resources, and approves or mandates fishery conservation plans for the State of Alaska. BOF members are appointed by the governor for 3-year terms and must be confirmed by the legislature.

Under the current operating schedule, the BOF considers fishery issues for regulatory areas or groups of regulatory areas on a 3-year cycle. Proposals to create new or modify existing regulations and management plans are submitted by ADF&G and the public (any individual can submit a proposal to the BOF) for evaluation by the BOF. During its deliberations the BOF receives input and testimony through oral and written reports from ADF&G staff, members of the general public, representatives of local ACs, and special interest groups such as fishermen's associations and clubs. The public provides their input concerning regulation changes and allocation through submission of written proposals and testifying directly to the BOF, by participating in local AC meetings, or by becoming members of local ACs.

ADVISORY COMMITTEES

Local ACs have been established throughout the state to assist the Boards of Fisheries and Game in assessing fisheries and wildlife issues and proposed regulation changes. AC meetings allow opportunity for direct public interaction with ADF&G staff attending the meetings that answer questions and provide clarification concerning proposed regulatory changes regarding resource issues of local and statewide concerns. The Board Support Section within the ADF&G's Division of Administrative Services provides administrative and logistical support for the BOF and ACs. During 2010, the department had direct support responsibilities for 81 ACs in the state.

Within the NW/NSMA there are 9 ACs: the Arctic, Kotzebue, Lower Kobuk, Noatak/Kivalina, Northern Norton Sound, Northern Seward Peninsula, St. Lawrence Island, Southern Norton Sound, and Upper Kobuk committees. In addition, ACs from the Yukon River drainage occasionally comment on proposals concerning Northwest fisheries.

RECENT BOARD OF FISHERIES ACTIONS

The BOF meets annually, but deliberates on each individual regulatory area on a 3-year cycle, most recently for the NW/NSMA in January 2010 in Fairbanks. At this meeting, a housekeeping proposal was adopted involving the NW/NSMA. This proposal aligned the sport fish regulatory boundaries for the Yukon River, Northwestern, and North Slope management areas with the subsistence and commercial regulatory areas. This action did not change any specific drainage

regulations as the background regulations for all species in these areas were the same. At the February 2007 meeting the BOF adopted 2 proposals for the NW/NSMA. The BOF adopted a management plan encompassing subsistence, sport, and commercial king salmon fisheries in the Unalakleet River drainage (Appendix A). In addition, the BOF amended a regulation regarding subsistence fishing to state that a person may not sport fish for salmon in Northern Norton Sound freshwaters and take a subsistence harvest the same day.

ADF&G EMERGENCY ORDER AUTHORITY

ADF&G has emergency order (EO) authority (5 AAC 75.003) to modify time, area, and bag/possession limit regulations. EOs are implemented to deal with conservation issues not adequately controlled by existing regulations. Once implemented, an EO is in effect until the situation is resolved or the BOF can formally take up the issue. EOs are also used as a tool for inseason management of fisheries. Inseason management is usually in accordance with a fisheries management plan approved by the BOF. EOs issued under this authority for the NW/NSMA during 2010 are summarized in Appendix B.

FEDERAL SUBSISTENCE

The Alaska National Interest Lands Conservation Act (ANILCA) established a priority subsistence use of fish and game for federally-qualified rural residents on lands and waters for which the federal government asserts jurisdiction. The state of Alaska has also established a priority for subsistence use of fish and game by Alaskan residents (AS 16.05.258) on all lands and waters, but cannot discriminate between rural and urban residents (Alaska State Constitution Article VIII, sections 3 and 15). Because of this difference, the federal government asserted authority to ensure a priority subsistence use of fish and game for rural residents on federal lands and certain adjacent waters. On October 1, 1999 the federal government asserted regulatory authority for assuring the rural priority for subsistence fisheries on federal public lands, which includes non-navigable waters on public lands. Following the "*Katie John*" decision by the Ninth Circuit Court in 1995, the federal government expanded the definition of public land to include waters for which the federal agencies assert federal reserved water rights. Under current practice, the federal land management agencies adopt regulations to provide for the priority subsistence use by qualified rural residents in non-navigable waters within federal public lands (including Bureau of Land Management (BLM) lands) and in navigable waters adjacent to or within federal conservation system units (generally does not include BLM lands). The state retains all other fish and wildlife management authorities, including management on federal land.

The development of regulations for subsistence fisheries under the federal subsistence program occurs within the established Federal Subsistence Board (FSB) process. The public provides its input concerning regulation changes by testifying in Federal Subsistence Regional Advisory Council (RAC) meetings or by becoming council members. Ten RACs have been established throughout Alaska to assist the FSB in determining local subsistence issues and providing recommendations on proposed fishing and hunting regulations on the fish and game populations under consideration. Each RAC meets twice a year, and subsistence users and other members of the public can comment on subsistence issues at these meetings.

Within the NW/NSMA the subsistence fisheries for which the federal government asserts management responsibility include those in the Bering Land Bridge National Preserve, Selawik National Wildlife Refuge, Kobuk Valley National Park, Noatak National Preserve, Cape

Krusenstern National Monument, Alaska Maritime National Wildlife Refuge, Gates of the Arctic National Park, and the Arctic National Wildlife Refuge. The Unalakleet National Wild and Scenic River is under federal fisheries management, but only from the headwaters down to the Chiroskey River. In addition, portions of the Kobuk, Noatak, Salmon, and Selawik rivers are designated as Wild and Scenic Rivers. The NW/NSMA fisheries fall under the purview of the Seward Peninsula, Northwest, and North Slope RAC's. The most recent meetings were held in August (North Slope RAC), September (Northwest RAC), and October (Seward Peninsula RAC). No fisheries-related proposals were addressed by the RAC's in 2010. However, at the 2008 Seward Peninsula RAC meeting a proposal was supported by the RAC to close the federal public waters of the Unalakleet River drainage (upstream from the mouth of the Chiroskey River, or approximately 23 river miles from the village) to the taking of king salmon, in response to concerns regarding the harvesting of king salmon on the spawning grounds. The RAC's recommendation of support was forwarded to the FSB and the proposal was adopted by the FSB in March 2009. A listing of the addresses and contact numbers for these federal management units can be found in Appendix C.

REGION III DIVISION OF SPORT FISH RESEARCH AND MANAGEMENT STAFFING

The Region III Division of Sport Fish staff biologists are organized into a research group and a management group. The management group consists of a management supervisor, a regional management biologist, an area biologist for each of the 5 management areas, one or more assistant area management biologists, and 2 stocked water biologists. Area biologists evaluate fisheries and propose and implement management strategies through plans and regulation in order to meet divisional goals. A critical part of these positions is interaction with the BOF, ACs, and the general public. Stocked waters biologists plan and implement the regional stocking program for recreational fisheries. The regional management biologist assigned to the Region III headquarters office in Fairbanks also administers the regional fishing and boating access program.

The research group consists of a research supervisor, a salmon research supervisor, a resident species supervisor, research biologists, and various field technicians. Research biologists plan and implement fisheries research projects in order to provide information needed by the management group to meet divisional goals. The duties of the management and research biologists augment one another.

STATEWIDE HARVEST SURVEY

Sport fishing effort and harvest of sport fish species in Alaska have been estimated and reported annually since 1977 using a mail survey (Mills 1979-1980, 1981a-b, 1982-1994; Howe et al. 1995-1996, 2001a-d; Walker et al. 2003; Jennings et al. 2004, 2006a-b, 2007, 2009a-b, 2010a-b, 2011a-b). The Statewide Harvest Survey (SWHS) is designed to provide estimates of effort, harvest, and catch on a site-by-site basis. It is not designed to provide estimates of effort directed towards a single species. Species-specific catch-per-unit-effort (CPUE) information can seldom be derived from the report. Two types of questionnaires were mailed to a stratified random sample of households containing at least one individual with a valid fishing license (resident or non-resident). Information gathered from the survey includes participation (number of anglers and days fished), number of fish caught and number harvested by species and site. These surveys estimate the number of angler-days of fishing effort expended by sport anglers

fishing Alaskan waters, as well as the sport harvest. Beginning in 1990, the survey was modified to include estimation of catch (release plus harvest) on a site-by-site basis. Survey results for each year are not available until the following year; hence, the results for 2010 were not available until fall 2011. Additionally, creel surveys have been selectively used to verify the mail survey for fisheries of interest, or for fisheries that require more detailed information or inseason management.

The utility of SWHS estimates depends on the number of responses received for a given site (Mills and Howe 1992). In general, estimates from smaller fisheries with low participation are less precise than those of larger fisheries with high participation. Therefore, the following guidelines were implemented for evaluating survey data:

1. Estimates based on fewer than 12 responses should not be used other than to document that sport fishing occurred;
2. Estimates based on 12 to 29 responses can be useful in indicating relative orders of magnitude and for assessing long-term trends; and,
3. Estimates based on 30 or more responses are generally representative of levels of fishing effort, catch, and harvest.

For purposes of reporting and organizing statistics in the SWHS, the Seward Peninsula-Norton Sound, Northwest Alaska, and North Slope areas are designated as survey areas W, X, and Z.

SPORT FISH GUIDE LICENSING AND LOGBOOK PROGRAM

Since 1998, the Division of Sport Fish has operated a program to register and/or license both sport fishing guides and sport fishing guide businesses, and to collect information on sport fishing participation, effort, and harvest by saltwater and freshwater guided clients (Sigurdsson and Powers 2009). In 1998, the BOF adopted statewide sport fishing guide regulations (5 AAC 75.075) which required all sport fishing guides and businesses to register annually with ADF&G. At this time the BOF also adopted statewide regulations that required logbooks for saltwater charter vessels. The logbooks collected information on charter activity (location, effort, and harvest) that was necessary for the BOF for allocation and management decisions specific to king salmon (*Oncorhynchus tshawytscha*), rockfish (*Sebastes* spp.), and lingcod (*Ophiodon elongatus*) and for the North Pacific Fishery Management Council (NPFMC) for allocation of Pacific halibut (*Hippoglossus stenolepis*).

In 2004, the Alaska Legislature adopted House Bill 452 that established licensing requirements for sport fishing guide business owners and sport fishing guides on a statewide basis (effective 2005). This legislation also required logbook reporting for all freshwater guiding businesses, in addition to the existing saltwater reporting requirements. The logbook data provides location of fishing effort, level of participation, and number of species kept and released by clients. This information is used for the regulation, development, and management of fisheries and has been published annually since 2008 in a Fishery Data Series report (Sigurdsson and Powers 2009-2011).

SECTION I:
NORTHWEST/NORTH SLOPE MANAGEMENT AREA OVERVIEW

MANAGEMENT AREA DESCRIPTION AND ITS FISHERIES RESOURCES

The NW/NSMA includes all waters north of the Yukon River drainage in Norton Sound, the Seward Peninsula, Kotzebue Sound (including the major drainages of the Kobuk and Noatak rivers), and all north-draining waters of the Brooks Range east to the Canadian border (Figures 2-6). The total land area consists of approximately 147,992 mi^2 (383,301 km^2). Fish species present in the NW/NSMA include: anadromous Dolly Varden *Salvelinus malma*; king *Oncorhynchus tshawytscha*, coho *O. kisutch*, chum *O. keta*, sockeye *O. nerka*, and pink salmon *O. gorbuscha*; Bering cisco *Coregonus laurettae*; humpback whitefish *Coregonus pidschian*; as well as freshwater resident Arctic grayling *Thymallus Arcticus*, Dolly Varden, Arctic char *Salvelinus alpinus*, northern pike *Esox lucius*, sheefish *Stenodus leucichthys*, round whitefish *Prosopium cylindraceum*, least cisco *C. sardinella*, humpback whitefish, broad whitefish *C. nasus*, burbot *Lota lota*, and lake trout *Salvelinus namaycush*.

Norton Sound/Seward Peninsula Subarea

Drainages in southern Norton Sound (Figure 3) include the Golsovia, Unalakleet, Egavik, Shaktoolik, Inglutalik, Ungalik, and Koyuk rivers. All but the Koyuk River drain the Nulato Hills, which separate Norton Sound from the Yukon and Koyukuk River valleys. Of these, the Unalakleet River is the largest and most heavily utilized. The village of Unalakleet is located at the mouth of this river. The Unalakleet River has been designated a National Wild River and supports anadromous populations of Dolly Varden; king, coho, chum, and pink salmon; and resident populations of Dolly Varden, Arctic grayling, and whitefishes *Coregonus sp.* Other area streams provide the opportunity for high-quality fisheries for the same species, but are not as intensively fished because of their remote nature and difficult access.

Many streams located along the southern half of the Seward Peninsula between Koyuk and Teller, (Figure 4) including the Fish, Niukluk, Eldorado, Nome, Snake, Sinuk, Feather, Tisuk, Pilgrim, and Kuzitrin rivers, are accessible via the Nome road system and offer sport fishing opportunity for Arctic grayling, Dolly Varden, salmon, and northern pike (northern pike are found in the Fish, Pilgrim, and Kuzitrin rivers). Small sockeye salmon runs have historically occurred in the Pilgrim and Sinuk rivers, although they have increased markedly in recent years, and based on counting tower and weir information a few remnant late run sockeye salmon are present in other locations in Norton Sound. King salmon are present in the Pilgrim, Niukluk, and Fish rivers. Trophy Arctic grayling, larger than 3 lbs (1.4 kg), are present in many Seward Peninsula waters. Of the 444 Arctic grayling registered in the ADF&G trophy fish program since 1967, 61 were taken from Seward Peninsula waters, and 26 of those were taken from the Sinuk River. The new state record Arctic grayling (5lbs 3oz) was caught and released from the Fish River drainage in 2008. Remote streams such as the Koyuk, Tubutulik, Kwiniuk, and Agiapuk rivers are accessible by aircraft or boat from nearby villages. These rivers receive little

sport fishing effort but provide opportunity for remote high-quality fisheries. Scanlon and DeCicco (2007) provides more detail on these fisheries and other remote systems.

Kotzebue Sound/Chukchi Sea Subarea

Major drainages flowing into the Kotzebue Sound and Chukchi Sea include the Selawik, Kobuk, Noatak, Wulik, Kivalina, and Buckland rivers (Figure 5). The Noatak River is a National Wild River and most of the drainage is included in the Noatak National Preserve (Figure 5). The extreme upper headwaters of both the Noatak and Kobuk rivers are included in Gates of the Arctic National Park. A portion of the Lower Kobuk Valley, between the villages of Kiana and Ambler, is included in the Kobuk Valley National Park. The Salmon River, the upper mainstem of the Kobuk River and the Selawik River are also National Wild Rivers. Much of the Selawik River valley is part of the Selawik National Wildlife Refuge. For maps and information regarding federal lands in the Kotzebue Sound/Chukchi Sea Subarea, see the contacts provided in Appendix C.

The Noatak River Drainage supports resident populations of whitefish, Arctic grayling, Dolly Varden, lake trout, burbot, and northern pike. Sheefish use the lower reaches of the river for feeding during the spring, but are not known to spawn there (Alt 1987). The Noatak River produces a large run of chum salmon that contributes to a Kotzebue-based commercial fishery. During the commercial salmon fishery in August, a significant incidental harvest of adult Dolly Varden can occur, since thousands of anadromous Dolly Varden overwinter in the lower 200 miles of the river and spawn in some of the river's tributary streams. This system is known for its trophy size Dolly Varden. Many thousands of anadromous Dolly Varden overwinter in the lower 300 km of the river and spawn in some of the river's tributary streams. The Noatak River produces a large run of chum salmon that contributes to a Kotzebue-based commercial fishery. During the commercial salmon fishery in August, a significant incidental harvest of adult Dolly Varden can occur.

The Kobuk River contains the largest spawning population of sheefish in northwestern Alaska. Sheefish migrate over 300 miles to spawn in the upper reaches of the drainage. Hotham Inlet, Selawik Lake, and the delta system at the river's mouth serve as winter feeding areas for juvenile and adult sheefish. The Alaska state record sheefish, 53 lbs, was taken in 1986 from the Upper Kobuk River. Abundant numbers of whitefish (*C. sardinella, C. nasus, C. pidschian*) utilize the river, as well as Selawik Lake and Hotham Inlet (Kobuk Lake). Whitefish support important subsistence fisheries in villages along the river. Dolly Varden, northern pike, Arctic grayling, burbot, lake trout, and Arctic char inhabit various parts of the Kobuk River watershed.

The Selawik River also supports a spawning population of sheefish that shares rearing and winter feeding areas with the Kobuk River population. Sheefish in both populations are slower growing, live longer and attain a larger size than those in other areas of Alaska (Alt 1987). The Selawik River drainage and associated wetlands provide abundant habitat for whitefish and northern pike.

Other important waters include the Wulik and Kivalina rivers that drain into the Chukchi Sea near the village of Kivalina. These drainages provide rearing, spawning and winter habitat for diadromous Chukchi Sea Dolly Varden. All 5 species of North American Pacific salmon, Arctic grayling, burbot, and whitefish occur in these relatively small drainages; however, except for chum salmon in the Wulik River, most populations of these other species are small.

North Slope Area

The North Slope of the Brooks Range (Figure 6) includes all waters north of the Brooks Range flowing into the Beaufort and Chukchi seas from Point Hope on the west to the Canadian border on the east including adjacent saltwater areas. Major drainages in this area include the Colville, Sagavanirktok, Canning, and Kuparuk rivers. These drainages provide rearing, spawning, and wintering habitat for diadromous Beaufort Sea Dolly Varden. The state's third largest lake, Teshekpuk Lake, is found here on the coastal plain, as are hundreds of smaller lakes. Most of these lakes are inaccessible by road and too shallow to support fish populations, but there are dozens of lakes that contain lake trout, Arctic char, Arctic grayling, and burbot. These populations are generally slow-growing and can support only minimal harvests.

COMMERCIAL FISHERIES

Although small when compared to the major commercial fisheries in southeast and southwest Alaska, the commercial fisheries in northwest Alaska form an economic base for income and employment in many local communities. Commercial harvests of salmon, herring, halibut, and crab are usually much larger than sport harvests for those species (except on the North Slope where currently there are no commercial fisheries for salmon, and consequently all references to commercial fisheries in this report refer to those in Norton and Kotzebue sounds). In addition, extremely limited commercial fisheries exist for freshwater species such as sheefish, Dolly Varden, and whitefish.

Commercial fisheries for salmon in the Norton Sound District have been ongoing since 1961. The initial species of interest were king and coho salmon, but commercial fisheries have since developed for chum and pink salmon. The district is divided into 6 subdistricts to facilitate management of individual stocks or stock groups. Subdistricts include: 1) Nome; 2) Golovin; 3) Moses Point; 4) Norton Bay; 5) Shaktoolik; and, 6) Unalakleet (Figure 7). Conservation concerns for chum salmon stocks have resulted in no commercially harvested chum salmon in the Nome Subdistrict since 1996. Average commercial harvests over the last 5 years (2005–2009) in the entire Norton Sound District have been 170 king, 109,902 coho, 19,140 chum, 94 sockeye, and 19,303 pink salmon (Table 1). In 2010, commercial harvests in Norton Sound were 140 king, 103 sockeye, 62,079 coho, 117,743 chum salmon, and 31,557 pink salmon. The 2010 chum salmon harvest was the largest ever recorded in Norton Sound (Menard et al. 2011), and likely could have been higher had the buyer not been near its capacity to process and store fish (Scott Kent, ADF&G, Kotzebue, personal communication).

The Port Clarence District includes all waters from Cape Douglas north to Cape Prince of Wales, including the drainages of the Pilgrim and Kuzitrin rivers (Figure 7). Commercial salmon fishing has been prohibited in this district since 1967. Few stocks are present and their run sizes are relatively small; however, the sockeye salmon run into Salmon Lake that passes through the district had increased to over 85,000 fish in 2004, 56,000 in 2005, 52,000 in 2006, and 43,437 in 2007 (Table 2) . In 2007, due to these recent increases in sockeye salmon returns, a commercial fishery for sockeye salmon was permitted for the first time, with a guideline harvest limit of 10,000 sockeye salmon. However, participation was low (3 permit holders) and catches of chum salmon exceeded sockeye salmon 3 to 1 (3,183 to 1,152; Soong et al. 2008). In 2009, the escapement of sockeye salmon into Salmon Lake dropped to 953 fish, and in 2010 was 1,654 fish (Table 2). Consequently, there have been no commercial openings for sockeye salmon since 2007.

The Kotzebue Sound District includes all waters from Cape Prince of Wales to Point Hope (Figure 8) and is the northern most commercial fishing district in Alaska. The current commercial fishery opened under state management in 1962, but there are documented sales of salmon in the Kotzebue area dating back to the early 1900s. This is primarily a chum salmon fishery with a few king salmon taken annually and an incidental take of Dolly Varden that pass through the fishery in August. Average commercial harvests over the past five years (2005–2009) in the Kotzebue Sound District have been 147,826 chum salmon and 554 Dolly Varden (Menard et al. 2011; Table 1). In 2010, the chum salmon harvest in the Kotzebue Sound District was 270,343 fish, the highest harvest since 1995 (Table 1). There is also a directed under ice commercial fishery on sheefish in Hotham Inlet. Documented annual harvests in this fishery have averaged fewer than 50 fish over the past several years and the harvest quota of 25,000 pounds has never been met. Georgette and Shiedt (2005) document these fisheries in greater detail.

Division of Commercial Fisheries conducts annual assessments of salmon escapements using weirs, counting towers, and aerial surveys. Weirs and towers are thought to provide more accurate measures of escapement than aerial surveys and these methods have been expanded to cover more streams during recent years (Table 2). The status of Norton Sound chum salmon stocks of concern was reviewed by the BOF as part of the 2010 meeting cycle and a biological escapement goal (BEG) for chum salmon based on combined weir, tower, and aerial survey counts in Nome Subdistrict streams was established. In addition, sustainable escapement goals (SEGs) have recently been developed for salmon stocks that lacked adequate data for the development of more formalized BEGs (Table 2). Currently, there are 25 escapement goals for Norton Sound area salmon stocks (10 for chum, 5 for king, 5 for pink, 3 for coho, and 2 for sockeye salmon; Volk et al. *In prep*).

SUBSISTENCE FISHERIES

There are approximately 23,600 people living in the NW/NSMA. Except for the two larger communities of Nome and Kotzebue, the population is scattered among 26 small villages along the coast and the major area rivers (ADL 2010). Most of the population is composed of Alaska Natives, many of whom lead a relatively traditional lifestyle. Many area residents rely heavily on the subsistence use of fish and wildlife for their livelihoods. Although personal use fisheries are also allowed, there has been no participation in these fisheries in the NW/NSMA largely because all Alaska residents qualify as subsistence users. Subsistence harvests of salmon, Dolly Varden, sheefish, whitefish, and crab are very important to the livelihood of the many small villages in the NW/NSMA, and are generally much larger than the sport fish harvests which generally make up the smallest component of overall use in most years.

Subsistence use of salmon is monitored in village surveys conducted by the ADF&G Division of Subsistence and by permits issued by and returned to Division of Commercial Fisheries. Recent subsistence salmon harvests (2005–2009) have averaged about 73,000 fish in the Norton Sound District (Table 3). This average harvest was composed of 3,243 king, 631 sockeye, 15,579 coho, 43,817 pink, and 9,892 chum salmon. In 2010, 72,987 salmon were harvested in the Norton Sound District. Of these, 2,120 were king, 546 sockeye, 11,863 coho, 42,254 were pink, and 16,201 were chum salmon. The recent 5-year (2005–2009) average subsistence salmon harvest in the Port Clarence District was 15,205 fish, composed of 136 king, 6,615 sockeye, 766 coho, 4,687 pink and 3,002 chum salmon (Menard et. al 2011; Table 3).

In 2001, the BOF passed a regulation expanding legal gear for subsistence fishers to include a line attached to a rod or pole in all waters of northern Norton Sound from Cape Espenberg along the coast to Bald Head Point, which encompasses all waters of the Port Clarence District, as well as the Nome and Golovin subdistricts (Figure 7). Although standard sport fishing gear can be used for subsistence fishing in these areas, sport fish methods and means regulations still apply (e.g., no snagging in freshwater, etc.). Sport fish bag and possession limits by species as specified in 5 AAC 70.011 also apply, except when fishing through the ice or when a subsistence permit is required (such as in the Port Clarence District and the Nome and Golovin subdistricts), in which case the limits specified in the subsistence permit will apply. However, in all areas where sport gear is legal, subsistence gear is as well. Fishers cannot combine sport fish bag and possession limits with subsistence harvest permit limits.

In 2003, subsistence fishing opportunity in the Nome Subdistrict of Norton Sound was severely restricted because of low salmon abundance. In 2004, fishing opportunity was expanded because of abundant sockeye and pink salmon. In 2005–2007, higher than expected runs of chum salmon, in addition to abundant pink and sockeye salmon runs, allowed for a more relaxed subsistence fishing schedule. In 2008, chum salmon returns were down and restrictions were put in place for the subsistence fishery in the Nome Subdistrict (sport fishing for chum salmon has been closed by regulation since 2001); however, pink salmon escapements were near record highs in many areas (Table 2). Sockeye salmon escapements in the Pilgrim River, which have averaged over 50,000 fish from 2003–2008, dropped to 953 fish in 2009 and 1,657 fish in 2010 (Menard et al. 2011; Table 2). In addition to salmon, other fish, including saffron cod, rainbow smelt, Dolly Varden, and whitefish, are taken. In the Kotzebue Sound District, the recent ten-year (2000–2009) subsistence salmon harvest has been about 36,000 chum salmon; however, subsistence harvest surveys (for all species) were not conducted in all 11 Kotzebue Sound District villages in all years, and therefore these reported catches underestimate the total harvest by some unknown amount (Table 3). In 2007, the residents of Kivalina harvested a total of 4,568 chum salmon; however, this survey did not include villages along the Kobuk and Selawik rivers or the village of Kotzebue, and so total chum salmon harvests were likely much higher (Magdanz et al. 2010).

In the Kotzebue Sound District sheefish and other whitefish species are also an important subsistence resource, especially in Kotzebue, Selawik, and the villages along the Kobuk River. The relative importance of whitefish is higher in the Kotzebue Sound District than in many areas of the state, with much of the whitefish harvest including sheefish harvested by jigging through the ice in Hotham Inlet in the spring. The average subsistence harvest of whitefish for the village of Noatak and the 5 Kobuk River villages combined from 1998 to 2002 was 44,552 fish. In 2003, 73,242 whitefish were estimated harvested, and in 2004, 50,501 were estimated harvested (Fall et al. 2003; Brown et al. 2005; Georgette and Shiedt 2005).

ESTABLISHED MANAGEMENT PLANS AND POLICIES

Regulations governing fisheries in the NW/NSMA are found in 5 AAC 69.101 through 5 AAC 69.995 (North Slope Area sport fishing) and 5 AAC 70.001 through 5 AAC 70.995 (Northwestern Area sport fishing), and in 5 AAC 01.100 through 5 AAC 01.190 (subsistence fishing). The recently-adopted (February 2007) *Unalakleet River King Salmon Management Plan*, which encompasses sport, subsistence, and commercial regulations, is found in 5 AAC 04.395 (Appendix A).

Fisheries-specific management objectives for the management area have been identified in management plans for Arctic grayling and lake trout. In addition, a series of general divisional criteria have been prepared to guide establishment of fishery objectives, and include:

1. **Management and protection of existing fish resources**. Divisional activities should strive to manage and protect Alaska's wild fish stock resources for future generations;
2. **Public use and benefits of existing fish resources**. Alaska's fishery resources should be made available for public use and benefit on a sustained yield basis;
3. **Rehabilitation of depressed stocks and damaged habitat**. Division activities should strive to restore and maintain fish stocks and habitat damaged by man's activities; and,
4. **Enhancement of natural production or creation of new opportunities**. The Division should pursue creation of new sport fishing opportunities through rehabilitation of natural stocks or creation of new fisheries where these opportunities do not negatively impact other fisheries.

Two regionwide management plans that affect fisheries in the area have been completed. A regional management plan for Arctic grayling was adopted by the BOF in January 2004 (5 AAC 70.055). The *Wild Lake Trout Management Plan (*5 AAC 70.040-*)* was adopted for the AYK region by the BOF in February 2007 (Burr 2006). Revision of existing plans, as well as the development of additional fisheries management plans, will occur as needed in response to changes in use patterns as new quantitative information becomes available.

Wild Arctic Grayling Management Plan (5 AAC 69.155, 2009; 5 AAC 70.055, 2009). This management plan directs the department to manage wild Arctic grayling populations in the NW/NSMA for long-term sustained yield through a conservative harvest regime. The plan establishes and defines three management approaches under which the department shall manage wild Arctic grayling populations in the NW/NSMA: 1) the regional management approach; 2) the conservative management approach; and, 3) the special management approach. The plan also outlines guidelines and considerations for the department, public and/or BOF to change or address the management approach for a water body or fish stock.

Wild Lake Trout Management Plan (5 AAC 69.140, 2009; 5 AAC 70.040, 2009). This management plan directs the department to manage wild lake trout populations in the NW/NSMA by employing a conservative harvest regime and by maintaining harvest below the maximum sustained yield level. The department may take one or more management action if there is a conservation or biological concern for the sustainability of the fishery or a stock harvested in that fishery. These actions include reduction of bag and possession limit, reduction of fishing time, allowing only catch-and-release, and modification of methods and means of harvest. The plan also specifies allowable measures to reduce harvest if the harvest level exceeds sustainable yield for a two year period. Finally, the plan establishes a process for designating special management waters and means for limiting harvest in these areas to meet the management objectives.

MAJOR ISSUES FOR THE NORTHWEST/NORTH SLOPE MANAGEMENT AREA

1. *Unalakleet River king salmon*. The Unalakleet River sustains the highest sport fishing effort of any single river in the NW/NSMA and supports the largest directed

king salmon fishery in the area. In addition, the residents of Unalakleet and Shaktoolik depend heavily on king salmon for subsistence uses and, when escapements are large enough, income through a directed commercial fishery. Currently there is a sustainable escapement goal (SEG) for king salmon using an expansion of the tower counts on the North River (a large Unalakleet River tributary) of 1,200 to 2,600 fish. After a historic high of 4,185 fish in 1997, tower counts have declined steadily, and the counts have failed to reach the lower end of the SEG for 5 out of the last 10 years (2000–2009). In 2006, the count was 906 fish, which was the all-time low until it was eclipsed in 2008 (903 fish). In 2010, a late push of fish came into the river and the final tower count was 1,256 fish (Table 2). Uncertainty regarding the reasons for the declines in escapement, coupled with continued pressure from multiple user groups makes the Unalakleet River king salmon stock a primary concern for fisheries managers in northwestern Alaska.

2. *Wulik River Dolly Varden*. Development of a world-class zinc deposit at the Red Dog site in the Upper Wulik River drainage carries the risk of heavy metal contamination on one of the most important streams in Northwest Alaska for Dolly Varden. There has been concern that heavy metal contamination of Red Dog and Ikalukrok creeks would occur both from natural leaching of the ore body as it was stripped for ore production and from discharge of contaminated waters into the river. A contamination problem in 1989 and 1990 has been controlled with additional wastewater treatment and the construction of a clean water bypass system in Red Dog Creek. Water quality is monitored by the Department of Natural Resources (DNR) and mine personnel. Contamination from dust along the road corridor has recently been documented by the National Park Service (NPS). In addition, final permits have been approved for expansion of the mine (called the Aqqaluk extension) which will extend the operational life of the mine from an original date for ore depletion of 2012 until 2031. The Division of Sport Fish conducts aerial surveys of Dolly Varden overwintering in the Wulik River annually and in cooperation with the Division of Habitat, collects fish from which tissues are sampled for heavy metal analyses twice each year.

3. *Nome area gold mining*. The future development of large-scale lode deposits of gold near Nome has the potential to degrade fish habitat in the Snake, Cripple, and Solomon River drainages. Recently, a large increase in the number of recreation suction-dredging operations has occurred in the nearshore marine waters of the Nome Subdistrict. This has generated concerns over turbidity plumes and conflicts with subsistence fishers. Interest in mining is directly related to the world price of gold. Development interest had declined with the price of gold, and in the past five years interest and development potential has escalated.

4. *Rural resentment of sport fishing and sport anglers*. Rural Alaskans often feel resentment toward “outsiders” who come into remote areas traditionally used by local people for subsistence hunting or fishing. There is sometimes a cultural bias against the concept of "sport fishing" and local residents feel that people do not have the right to "play" with food resources. The bias can be particularly strong towards catch-and-release practices and has led to some resentment of sport anglers who

wish to fish in remote waters of NW/NSMA, and to proposals before the BOF that would have eliminated catch-and-release in some fisheries.

5. *Effects of federal subsistence fisheries management on sport fishing opportunity in the NW/NSMA.* In October 1999, the federal fishery managers assumed responsibility for ensuring a rural subsistence priority on navigable waters adjacent to or within the boundaries of federal conservation units. There is continued concern that a result of this action will be reduced opportunity for sport fishing throughout Alaska. Since there is a large amount of federal public land within the NW/NSMA that is used by local residents for subsistence purposes, the potential loss of sport fishing opportunity in remote areas of the NW/NSMA is of acute concern to anglers and sport fish managers. The ADF&G continues to work with federal managers and Federal Subsistence Regional Advisory Councils (RACs) to address fisheries issues as they arise.

ACCESS PROGRAM

The Wallop-Breaux Amendment to the Sport Fish Restoration Act (Dingell-Johnson or D-J) mandates that at least 15% of the federal funds collected from taxes on boat gas and sport fishing equipment be used by the states for the development and maintenance of motorized boating access facilities. A broad range of access facilities can be approved for funding if they are constructed to achieve a state fishery management objective. These facilities can include boat ramps and lifts, docking and marina facilities, breakwaters, fish cleaning stations, restrooms, and parking areas.

To date, few access projects have been proposed for the rural areas of the NW/NSMA; however, a boat launching facility was recently built in the village of Unalakleet using Access funds. In early 2010, a request from the City Manager of Nome was submitted for a cooperative project with ADF&G to build a boat launch, parking area, and possibly a restroom facility on the mouth of the Snake River. However, it is unclear whether or not the city of Nome has the resources to maintain these facilities once they are built and therefore, any further planning for this project is suspended until this issue is resolved.

INFORMATION AND EDUCATION

Information regarding regulations, publications, stocking and fishing reports, news releases and EOs for the NW/NSMA can be found from the *Fishing* and *Sport* links at the ADF&G website (http://www.adfg.alaska.gov/index.cfm?adfg=fishing). From the *Interior Area* and *Northwest Drainages* link on this website, anglers interested in fishing in the NW/NSMA can read the area descriptions and from the *Fishing Information* and *fishing brochures* links download several Division of Sport Fish publications, including: *Nome Roadside Fishing Guide*, *Sheefish Catch & Release* (for anglers interested in fishing the Kobuk or Selawik River drainages), and *Sport Fishing along the Dalton Highway* (for those interested in fishing along the roadside on the North Slope). Also, *Dolly Varden and Arctic Char in Northern Alaska* can be helpful for anglers who fish in the NW/NSMA as both species are found in the area.

There are three regional information and education (I&E) staff located in the Fairbanks office. An Information Officer II and a seasonal Fisheries Technician III respond to questions from the public at the office and via phone and e-mail. In addition, I&E staff distribute and update fishery brochures, fishing regulations, the regional webpage, coordinate the Fairbanks Outdoor Show

booth and Kid's Fish & Game Fun Day, and the Becoming an Outdoors-Woman (BOW) program. An Education Associate II coordinates the sport fishing component of the Alaska Conservation Camp and works with schools in various communities throughout the region to provide a curriculum in sport fishing and aquatic education.

SPORT FISHING EFFORT, HARVEST, AND CATCH

The results of the SWHS indicate that effort in the NW/NSMA has remained more or less stable since 1996; however, estimated sport fishing effort in 2010 was the lowest ever recorded. Until 2010, effort since 1990 has ranged from 21,000 to 40,000 angler-days per year (Table 4). During 2010, the total sport fishing effort for the NW/NSMA was estimated at 18,464 angler-days, almost 9,000 less than the recent 10-year (2000–2009) average (25,742), with most of the decrease coming from Seward Peninsula waters (Table 4). The recent 5-year (2005–2009) average for sport fishing effort for the NW/NSMA is 27,399 angler-days (Table 4).

The Seward Peninsula and Norton Sound subarea accounts for most of the sport fishing in the NW/NSMA. Effort in the subarea has averaged 17,921 angler-days (65% of the area total) from 2005–2009 (Table 4). Rivers supporting the most sport fishing effort in the NW/NSMA have been the Unalakleet, Fish/Niukluk, and Nome rivers. Angler effort was estimated at 3,012 angler-days for the Unalakleet River in 2010, approximately 28% of the total effort in the subarea (Table 4). The Nome River has been closed to fishing for Arctic grayling and chum salmon since the early 1990s, and it is likely that these closures contributed to a reduction of fishing effort on this stream. Annual effort in the Nome River has averaged 2,531 angler-days from 2000–2009 but has averaged 3,725 from 2005–2009 (Table 4). The recent increases in effort are probably due to the recent large runs of pink and coho salmon present, as well as increased employment in the Nome area and the subsequent rise in the number of nonresident anglers that lived in Nome for the summer. The Fish/Niukluk river system has sustained an annual average of 2,428 angler-days of effort from 2005–2009. After 2 years (2008–2009) of fishing effort of over 3,800 angler-days, the number of angler days dropped to 1,844 in 2010 (Table 4). Estimated effort on the Snake and Pilgrim rivers has averaged about 1,170 and 400 angler-days from 2005–2009 (Table 4).

In the Kotzebue/Chukchi Sea subarea, sport fishing effort has been somewhat more variable, ranging from about 3,000 to 7,400 angler-days per year from 2000–2009 (Table 4). In 2010, there were an estimated 3,470 angler-days in the subarea (Table 4). The large drainages of the Kobuk and Noatak rivers support more than half of the freshwater effort in this subarea during most years while the remainder is dispersed among smaller drainages such as the Wulik, Kivalina, and Selawik rivers, and many of the area's lakes. Expense of travel, difficulty of access, and small human population probably account for the low levels of sport fishing effort reported in this region.

In the North Slope subarea, sport fishing effort is generally light but variable, with most effort focused on streams and lakes along the Dalton Highway (Haul Road) where access is less difficult. The average effort from 2000–2009 was 4,394 angler-days, with almost 50% of that coming from Haul Road fisheries (Table 4). In 2010, sport fishing effort was 4,384 angler-days. Most of this effort has been historically directed at Dolly Varden, Arctic char, lake trout, and Arctic grayling fisheries in close proximity to the road system.

Harvest and catch of Pacific salmon were both down precipitously from the recent ten-year averages (Tables 5 and 6). Salmon harvest in 2010 was 9,514 fish; 34% less that the recent 10-

year average of 12,281 fish, with king salmon harvest (61 fish) down by 86% (Table 5). The Unalakleet River provides for 75% of the harvest and 85% of the catch of king salmon in the NW/NSMA in the past 10 years, and with low escapement and consequent early-season closure of the sport fishery by emergency order (Appendix B), all fishing for king salmon was done on July 8. Catches of Pacific salmon in the NW/NSMA in 2010 were 26,331 fish; down 47% from the recent 10-year average of 41,588 (Table 6). Much of the decrease can be attributed to smaller runs of coho salmon into Norton Sound drainages and in particular the Unalakleet River drainage, where the coho salmon escapement into the North River dropped from 22,226 fish in 2009 to 7,608 fish in 2010 (Table 2). In addition, the daily bag and possession limit in 2009 was doubled from three to six for coho salmon in the Unalakleet River drainage to provide for increased harvest during such a large return, whereas this was not the case in 2010.

Harvest and catch of Arctic grayling and Dolly Varden were also down considerably in 2010 compared to recent averages. Harvest of Dolly Varden was down 55% in 2010 (2,551 fish) compared to the recent 10-year average of 5,662 fish. Similarly, harvest of Arctic grayling dropped 63% in 2010 (1,206 fish) from the recent 10-year average of 3,242 fish (Table 5). Catch for each species in 2010 also fell from recent 10-year averages but the decrease in Arctic grayling was not as dramatic. Catch of Dolly Varden was 12,845 in 2010 and of Arctic grayling was 23,318, compared to recent 10-year averages of 20,166 and 26,918 fish respectively (Table 6).

Harvest and catch of other non-salmon species in 2010 remained fairly low and close to recent 10-year averages (Tables 5 and 6). More detailed descriptions of specific important fisheries by location and species can be found in Section II.

SECTION II: FISHERIES

NW/NSMA waters offer some of the most remote and diverse angling opportunities available in Alaska. Opportunities to fish for Dolly Varden, sheefish, and Arctic grayling in pristine areas without encountering other anglers are widespread. Angling opportunities for salmon, especially chum, pink, and coho salmon are not as well known, but can be excellent. Marine sport fisheries have been virtually non-existent throughout the area, although in Norton Sound anglers occasionally try trolling for salmon (king, coho, and pink) on calm days, but the proportion of angler-days spent fishing in saltwater is generally less than 5% of the total annual areawide effort. Guided sport fishing comprises a small amount of the effort in northwestern Alaska and from 2006–2010. Only 19 guided anglers have fished in North Slope waters (Sigurdsson and Powers 2009, 2010, 2011). Through the ice jigging for saffron cod, smelt, flounder, sheefish, Arctic grayling and Dolly Varden is common near coastal settlements, but these fisheries generally operate under subsistence fishing regulations.

NORTHWESTERN ALASKA SALMON FISHERIES

Sport fishing for salmon takes place throughout the management area. However, the vast majority of salmon fishing occurs in the Seward Peninsula/Norton Sound subarea, with concentrated effort near Unalakleet and in waters accessible from the Nome area road system. Some salmon fishing effort occurs in association with wilderness float trips in Kotzebue Sound drainages, but the amount of sport fishing effort expended toward salmon in the northern part of the management area is very light and harvests are very small.

Over the past 5 years (2005–2009), about 61% of the total average salmon harvest has been coho, 26% pink, 9% chum, 3% king, and 1% sockeye salmon. In 2010, 62% of the total salmon harvest was coho, 29% pink, 9% chum, 1% king, and 0% sockeye salmon (Table 5).

UNALAKLEET RIVER SALMON FISHERIES

Background and Historical Perspective

The village of Unalakleet, with a population of about 800, is located on the shore of Norton Sound at the mouth of the Unalakleet River. Daily air service from Anchorage and Nome provides access for anglers visiting the Unalakleet area. The Unalakleet River supports substantial runs of king, chum, coho, and pink salmon. Most of the angling effort on the Unalakleet River is directed toward king and coho salmon, but other species of salmon, Arctic grayling, and Dolly Varden are also targeted. The king salmon run usually begins in mid-June, peaks during the first week of July, and continues through late-July. Anglers access the river by boat from the village of Unalakleet and are composed of a mix of local residents, visitors who rent boats or fish with friends, and visitors who stay at one of the two sport fishing guide operations on the river. Most sport fishing effort occurs in the lower 15 miles of the Unalakleet River and in the lower 5 miles of the North River, a tributary which enters the Unalakleet River about seven miles upstream from its confluence with the Bering Sea. Sport fishing for king salmon in the Unalakleet River is popular with both guided, nonresident anglers, as well as local residents. Generally, about 60% of the king salmon harvested from the river each year are taken

by local residents. The U.S. Air Force operated a sport fishing recreational camp on the Unalakleet River, 8 miles upstream of the village, during the 1960s. A commercial sport fishing lodge was constructed there in the late 1960s. The Unalakleet Native Corporation owned the lodge for several years and contracted operations. The lodge is currently in private ownership. Local residents guide anglers on the river and guiding operations from the Yukon River drainage will sometimes visit the river during the peak of the king and coho salmon runs. However, the majority of angling on the Unalakleet River is by unguided anglers. An unpublished survey by the Division of Sport Fish in the 1990s estimated that only about 8.5% of salmon anglers on the Unalakleet River were guided. Based on estimated effort levels and known effort by the largest guiding business, it is likely that guiding currently accounts for about 25% of the total angling effort on the Unalakleet River.

Recent Fishery Performance

Since 1995, the Unalakleet River sustained the highest sport fishing effort of any single river in the NW/NSMA in all but 5 years. The 2002 effort was the highest on record at 8,195 angler-days, and from 2005–2009 averaged 4,699 angler-days (Table 4). Unalakleet River salmon harvests trended upward between 1991 and 2000, and have remained relatively stable until 2008, when a record number of salmon were harvested (8,861 fish), principally pink and coho salmon (Tables 7–10). In 2010, the harvest of all salmon species was 3,661 fish, and the average annual sport harvest of all salmon species from the Unalakleet River from 2005–2009 was 6,224 fish. Coho salmon comprised about 77% of the average harvest, while king salmon made up about 5%. Approximately 100% of the entire NW/NSMA harvest of king salmon and 51% of the coho salmon harvest were taken from the Unalakleet River in 2010 (Tables 7 and 8).

The estimated sport harvest of king salmon in the Unalakleet River remained fairly stable from 1993 to 2002, averaging about 431 fish annually. From 2003–2009, king salmon harvest averaged 291 fish per year (Table 7). This decline in harvest was most likely a result of king salmon restrictions (no retention effective the 1st or 2nd week of July) in 6 of the 7 years during this period. In 2008, the estimated harvest increased to 580 fish; however, this may be inaccurate because one respondent reported catching and harvesting 32 "jack" king salmon (<20 inches) in a year with record low escapement (903 fish counted at the North River tower). This response seems very unlikely and these fish were probably Dolly Varden or pink salmon. The harvest estimate for king salmon ≥20 inches was 108 fish, a reasonable number considering the small size of the escapement and the harvests from recent years. The sport harvest of 61 king salmon in 2010 was the lowest since before 1991 (Table 7).

There have been no directed commercial fishing openings for king salmon since 2001 in the Unalakleet Subdistrict (Menard et al. 2011). Unalakleet and Shaktoolik king salmon stocks were designated "stocks of concern" by the BOF in January 2004. King salmon subsistence harvests in Unalakleet have ranged from 90 fish in 1966 to 6,325 fish in 1997 (Menard et al. 2011). The recent 5-year average (2005–2009) harvest was 1,862 fish. The 2010 subsistence harvest was estimated at 1,892 king salmon. The sport fish harvest over the same 5-year period has averaged 317 king salmon, or about 5% of the total Unalakleet salmon harvest (Table 7). In 2010, the estimated sport fish harvest of 61 fish was about 5% of the total Unalakleet king salmon harvest.

In 2010, it was projected that the North River would not reach the lower end of its escapement goal (1,200–2,400 king salmon) based on low catches of king salmon in the Division of Commercial Fisheries test net in the Unalakleet River and the North River tower count of 48 fish

on July 4. As a result, EO-3-KS-02-10 prohibited the retention of king salmon and eliminated the use of bait while sport fishing in the Unalakleet and Shaktoolik rivers. This EO was in effect from July 8 until August 15, 2010 (Appendix B). However, a late push of fish arrived in the river and the lower end of the escapement goal was reached by August 12. The final count was 1,256 king salmon past the North River counting tower.

Coho salmon are the most sought after salmon species in the Unalakleet drainage. The run usually begins around August 1, peaks during mid-August, and continues through mid-September. The estimated sport harvest of coho salmon in the Unalakleet River has averaged 4,823 fish from 2005–2009 including a record-high of 6,029 fish in 2008 (Table 8). In 2010, 3,006 coho salmon were harvested, the lowest number since 2003 (Table 8). The coho salmon sport fishery is more consumptive than all other Unalakleet salmon sport fisheries. Approximately 41% of coho salmon caught are harvested while about 31% of king, 8% of chum, and 12% of pink salmon (2005–2009 average) caught are harvested (Tables 7–10).

From 2005 to 2009, commercial harvests of coho salmon in the Unalakleet Subdistrict have averaged 77,525 fish (Menard et al. 2011). From 2005 to 2009, subsistence harvests of coho salmon in the community of Unalakleet averaged 7,605 fish. The 2010 subsistence harvest was estimated at 3,780 fish, which was the lowest amount since before 1994 (Menard et al. 2011). Rainy weather during coho season coupled with above average chum salmon harvests may have been contributing factors to the below average coho salmon harvests in 2010 (S. Kent, ADF&G, Nome, personal communication).

Historic escapement data for coho salmon in the entire Unalakleet River drainage are not available. Information on the proportion of the run that spawns in the mainstem Unalakleet River was not available until recently; however, counting tower counts from the North River probably give an indication of recent run strength. Based on the tower counts, the 2005 and 2007 escapements were over twice the size of the 2004 and 2006 escapements (Table 2). In 2009, the escapement was the highest on record with 22,226 fish past the counting tower. In 2010, the final count at the North River tower was 7,608 coho salmon.

Fishery Objectives and Management

Prior to 2007, there were no specific management objectives identified for salmon fisheries on the Unalakleet River. In 2007, the BOF also adopted the *Unalakleet River King Salmon Management Plan*, which mandates inseason management actions in the subsistence, sport, and commercial king salmon fisheries to achieve the escapement goal based on North River tower count projections (Appendix A). In 2007, the BOF adopted a revised North River king salmon sustainable escapement goal (SEG) of 1,200 to 2,600 fish. The management goal in the Unalakleet River is to maintain adequate escapements of king salmon into the system that will support utilization by the various user groups.

Current Issues and Fishery Outlook

Although sport fishing has been ongoing in the Unalakleet River drainage for many years, there is some local resentment of visiting anglers because a few Unalakleet residents feel that "outsiders" are competing for the local salmon resources. Previous declines in chum and coho salmon runs throughout western Alaska impacted the Unalakleet River drainage, although the effect appears to be less dramatic than in Nome Subdistrict streams where chum salmon runs have a long history of being depressed. Recent increases in escapements suggest that coho and

chum salmon returns in the Unalakleet River are at more acceptable levels, particularly for coho salmon. While the commercial harvests of king salmon in the Unalakleet Subdistrict have been minimal during the past nine years, sport harvests have stayed fairly consistent.

The upper reaches of the Unalakleet River (from the Chiroskey River to the headwaters) is a designated National Wild River and falls under federal subsistence management authority. Until recently, federal and state management have not been in conflict for fisheries in the Unalakleet River drainage. However, in March 2009, the FSB closed the federal public waters of the Unalakleet River (upstream from the mouth of the Chiroskey River, or approximately 23 river miles from the village) to the taking of king salmon from July 1–31. It is unclear how this will affect sport anglers looking to catch king salmon; however, the vast majority of the sport fishing effort occurs below the Chiroskey River and so will likely not be affected.

Recent Board of Fisheries Actions

In 2004, the BOF designated king salmon on the Unalakleet River a stock of concern and consequently instituted an annual sport bag limit of four fish per year, 20 in or larger in length, of which only two could come from the North River, and the bag limit was changed from one to two fish (only one 20 in or larger in length). Previously, there was no annual limit and the bag limit was one king salmon (20 in or larger in length) and 10 king salmon less than 20" in length. This action was in response to the escapements having failed to meet the lower end of the escapement goal for the previous three years. In addition, the "other salmon" limit was set at 10 fish of which only four could be chum, coho, or sockeye salmon in combination. This allowed additional harvest opportunity for pink salmon but limited chum, coho, and sockeye salmon harvest. Previously, the bag limit for "other salmon" had been 5 fish.

In 2007, the BOF adopted the *Unalakleet River King Salmon Management Plan*, which used thresholds within the escapement goal range and projected North River tower counts to trigger inseason management actions in the subsistence, sport, and commercial fisheries (Appendix A). With the adoption of this plan, the annual limit was reduced from four to two king salmon 20 inches or longer.

Current or Recommended Research and Management Activities

Salmon escapements in the Unalakleet River are monitored using a counting tower in the North River, a test net operated in the Unalakleet River downstream from the mouth of the North River, and by aerial surveys. The tower is a cooperative project funded through the Norton Sound Economic Development Corporation (NSEDC) and operated by the Unalakleet Indian Reorganizational Act Council (IRA) with guidance by the ADF&G, Division of Commercial Fisheries and provides a reliable estimate of escapement into the North River because of water clarity. Aerial surveys are difficult in the Unalakleet River because of its dark bottom and tannin-stained water. These surveys provide a measure of the minimum escapement, but are unreliable as an indicator of total escapement in this river. In addition, ADF&G, Division of Commercial Fisheries operates a test-net in the Lower Unalakleet River throughout the summer; however, the information collected from this project is primarily as a gauge of run timing for each salmon species and does not produce reliable escapement information.

A three-year coho salmon radiotelemetry project, supported in part by the Bureau of Land Management (BLM), began in 2004. Approximately 200 coho salmon were implanted with radio transmitters each year and tracked to spawning locations. Results of this project suggest

that 8%–15% of coho salmon entering the Unalakleet River migrate up the North River to spawn (Joy and Reed 2007). A similar research project was conducted on king salmon in the Unalakleet River during 1997 and 1998. In 1997, 37% of radiotagged king salmon and 40% in 1998 spawned in the North River (Wuttig 1998 and 1999). These data are used to expand the North River tower estimate to allow a relative estimate of the escapement in the entire drainage. In 2009 and 2010, the radiotelemetry experiment on king salmon was repeated, and preliminary results show that 34% of the escapement went into the North River in 2009, and 53% in 2010. These results are significantly higher than the previous 1997 and 1998 findings, which, could be biased low based on how late the king salmon run up the North River (Joy and Reed *In prep*).

The Division of Sport Fish staff have frequently assisted and cooperated informally with the Division of Commercial Fisheries and the Native Village of Unalakleet (NVU) on projects, including the partial funding of counting towers (from which spawning escapements are estimated), surveys for abundance, and observation of spawning concentrations.

In 2010, a floating weir was installed in the mainstem Unalakleet River approximately 14 river miles upstream of the village to enumerate and sample king salmon, and was scheduled to only be in operation from mid-June through July each year. The weir was installed successfully; however, there were problems capturing king salmon at the weir to sample, and the crew had to resort to beach-seining upriver to collect age, sex, and length data. Improvements to trap design were made for the 2011 season, and king salmon were easier to capture. In addition, because king salmon were still moving upriver when the weir was removed at the end of July, the 2011 season was extended into mid-August to ensure that all king salmon were counted. This is a federally-funded project through the Office of Subsistence Management, with cooperation from ADF&G's Divisions of Sport Fish and Commercial Fisheries, BLM, and NSEDC.

NOME AREA ROADSIDE SALMON FISHERIES

Background and Historical Perspective

Nine rivers, accessible from the road system near Nome, sustain some level of sport fishing effort for salmon (Figure 4). The Nome River has accounted for about 14% of all the sport fishing effort in the entire NW/NSMA during 2005 to 2009 (Table 4). An average of 2,750 salmon was harvested from the Nome River during this period, of which 52% were pink salmon (Tables 7-10). Chum salmon escapements had been increasing in the Nome River in recent years since the collapse in 1990, and had reached up to 7,034 fish in 2007, but in 2009 had dropped again to 1,565 fish. In 2010, the chum salmon escapement into the Nome River was 5,906 fish (Table 2). The pink salmon escapement dropped from over 1.1 million fish in 2008 to just 16,490 fish in 2009; however due to the alternating strong (even year) and weak (odd year) run life-cycle of pink salmon in general this drop was not unexpected. The parent year escapement for the 2009 return was 24,395 fish in 2007. The pink salmon escapement in 2010 was 171,760 fish, a reduction of 87% from record parent year 2008 (Table 2).

The alternate-year strong pink salmon run in Norton Sound has a major influence on salmon harvests in sport fisheries on road accessible streams. This relationship has been strongest in the Nome River because of its proximity to Nome and ease of access to visitors and residents alike. Effort on the Nome River dropped steadily from a high of 7,194 angler-days in 1990 to about 651 angler-days in 2003 (Table 4). Trends in effort have generally coincided with the abundance of pink salmon available to anglers; however, recent fluctuations in summer employment in the Nome area associated with mining have possibly contributed to the recent effort variation as

well. The recent five-year average (2005–2009) on the Nome River was 3,725 angler-days (Table 4). The pink salmon harvest of about 2,954 fish in 2008 was the second highest since 1996, and the number of angler days (5,272) in 2008 was the highest angler effort since 1992. The increased effort and harvest was likely influenced by a strong run of 1.1 million fish and reduced subsistence opportunity on depressed chum salmon stocks that likely focused local subsistence fishing effort on the abundant pink salmon, in part to meet the local need for salmon. In addition, coho salmon catch and harvest has been high recently, with the recent five-year averages being almost twice as high as the recent ten-year averages (Table 8).

The Niukluk and Fish rivers are also popular sport fishing locations for salmon (Figure 4). Two guiding operations are located on the Niukluk River and another uses helicopters to transport clients to the upper reaches of these rivers to fish primarily for Arctic grayling, but also coho salmon and Dolly Varden. In addition, Nome-based guides fish these rivers as well as other road accessible waters. Many residents of Nome have summer cabins on the Niukluk River or fish camps along the river. Residents of White Mountain also travel upriver to the Niukluk for recreation and because of the several good spots for beach-seining for salmon. Since the construction of the bridge over Safety Sound in 1980, as well as improvements to the road, access to the Niukluk and Fish rivers has improved and this area has become a desirable destination for the road-bound angler. From 2005–2009, the drainage sustained an average annual effort of 2,428 angler-days (Table 4), and an average of 1,325 salmon have been harvested annually from the Fish and Niukluk rivers, most of which (71%) are coho salmon (Tables 7–10). Since 2005, the lower bound of the escapement goal range for coho salmon (2,400–6,100) has been met every year, with 9,042 fish counted in 2010 (Table 2). Historically, king salmon have not been found in large numbers in the Niukluk River and escapement of king salmon into the Niukluk River has been less than 200 fish.

The Pilgrim River, with its headwaters at Salmon Lake, has historically been somewhat less popular for salmon fishing; however, large sockeye escapements over six of the last eight years have drawn additional subsistence effort to this drainage (Table 2). All five species of Pacific salmon occur in the Pilgrim River. Sockeye salmon spawn in Salmon Lake and initially the runs appeared to be responding positively to lake fertilization conducted by Norton Sound Economic Development Corporation (NSEDC) and favorable marine conditions (C. Lean, Biologist, NSEDC, Nome, personal communication); however, recent escapements have decreased and the efficacy of fertilization to enhance smolt condition or adult returns remains unclear (Hamazaki et al. 2012). The escapement of sockeye salmon past the weir in the Pilgrim River from 2004–2008 ranged from 20,448–85,520 fish, but dropped to 953 fish in 2009 and 1,654 fish in 2010 (Table 2). These compare to an average escapement of 5,400 for three years of enumeration between 2000 and 2002 (Table 2). There is a Bureau of Land Management (BLM) campground at the outlet of Salmon Lake, and from there, the river can be floated for about 25 river miles to the bridge at mile 65 of the Kougarok Road. Riverboats can be launched at the bridge for access to downstream locations. The Pilgrim River sustained an average annual effort of 395 angler-days from 2005–2009 (Table 4) and about 78 salmon have been harvested annually during that period (Tables 7–10). Some of this effort was directed towards other species, as the Pilgrim (and the nearby Kuzitrin River) provides anglers with access to the best northern pike fishing on the Nome road system. The Pilgrim River is also open to subsistence fishing with gill nets and beach seines, so it is likely that local residents that desire sockeye salmon from the Pilgrim River would use this gear under a subsistence fishing permit rather than by sport fishing with hook-and- line. This may explain, in part, the lower sport fishing effort and salmon harvest on the

Pilgrim River, when compared to those systems with larger runs of coho and pink salmon, species that are easier caught by sport fishing gear (such as Nome and Niukluk rivers). The Fish/Niukluk and the Pilgrim rivers are the only road accessible rivers where sport fishing for chum salmon is currently allowed; however, the combined annual harvests (2005–2009) from these drainages have only been 50 chum salmon, all from the Fish River drainage (Table 10).

The mouth of the Snake River is in downtown Nome. This small stream can be accessed from a bridge at about mile 8 of the Teller Road and from the nearby Glacier Creek Road. Over the past five years (2005–2009) the Snake River has sustained an average annual effort of 1,174 angler-days, with an annual harvest of 514 salmon, of which 56% were coho salmon and 42% pink salmon (Tables 4; 7–10). Other popular road accessible waters include the Solomon, Kuzitrin, and Sinuk rivers. The annual harvests in these rivers combined for the past five years (2005–2009) have averaged about 218 coho salmon and 207 pink salmon (Tables 8-9). During years of high pink salmon abundance (even years) this species has dominated catches and harvests in most Nome roadside streams (Table 9).

Recent Fishery Performance

While pink salmon are by far the most prevalent salmon found in Norton Sound roadside streams, with over one million fish returning to some streams in even years, the estimated sport harvest of pink salmon has averaged only about 2,120 fish in 2005–2009 and has comprised just 40% of the total salmon harvest. While not nearly as abundant, coho salmon are much more popular likely due to their size, aggressiveness, and superior flavor. The estimated sport harvest of coho salmon in roadside fisheries around Nome in 2005–2009 averaged 2,988 fish per year and comprised 57% of the total salmon harvest. Chum salmon fishing has been closed for many years because of depressed stocks, and both runs and harvests of sockeye and king salmon in the Nome area are negligible. Although sockeye salmon have recently returned in large numbers to the Pilgrim River, they are typically targeted with gillnets and seines under subsistence regulations.

Sport fishing effort in the Fish/Niukluk river system has ranged from a high of about 4,800 angler-days in 1999 to 1,049 angler-days in 2006, and averaged 2,428 angler-days from 2005 to 2009 (Table 4). The estimated harvest of salmon was 1,078 fish in 2010, of which 99% were coho salmon (1,069 fish; Tables 7-10). Although sport fishing for chum salmon is allowed in this drainage, harvest has remained low (Table 10) and most of the chum salmon harvested by rod and reel are by subsistence fishers. A low harvest of only a few hundred pink salmon occurred in the even years since 1998 in spite of an abundant run of this species, with over 1,000,000 fish on the Niukluk River in some years. This low harvest of pink salmon is likely due to the poor condition of the fish by the time they reach the Niukluk River, although 969 pink salmon were harvested in 2008, a year when the escapement on the Niukluk River was almost 670,000 fish (Tables 2 and 9). In 2010, the pink salmon harvest was 99 fish, and escapement was just over 434,000 fish.

The Pilgrim River is the other road accessible water where chum salmon sport fishing is still allowed, but there has been no harvest reported since 1995. Effort there in 2010 was estimated at 248 angler-days, below the recent 5-year (2005–2009) average of 395 angler-days (Table 4). Large returns of sockeye salmon from 2004 to 2008 likely reduced sport effort on other species and other systems, although in 2009 the sockeye salmon escapement was just 953 fish and the 2010 escapement was 1,654 fish (Table 2). The high quality of the sockeye salmon coupled with

ease of access and ability to use subsistence gear (gillnets and seines) in the river provides local residents with an abundant, easily-harvested source of fish without having to use sport fishing gear for less-desirable species.

Fishery Objectives and Management

There have been no specific management objectives identified for salmon fisheries for the Nome roadside streams. The goal of sport fishery management in these waters is to maintain opportunity for anglers to participate in the fisheries and to assure that escapement goals are met. Sport fishery harvests are small and emergency actions to restrict sport harvest are generally not contemplated unless escapement-monitoring projects indicate that a particular run is small and that restrictions in subsistence fisheries may be necessary in order to meet escapement goals. SEGs, based on aerial surveys, are in place. SEG goals based on tower estimates (Snake and Pilgrim rivers) and weir counts (Nome and Pilgrim rivers) will not be established until additional years of reliable data have been accumulated.

Current Issues

Until recently, Seward Peninsula chum salmon stocks had been in a steady decline since the early 1980s (Menard et al. 2011). This has led to increasingly restrictive sport and commercial management, and the initiation of Tier II subsistence fishery (limited to fishers who have a customary and direct dependence on a resource) in the Nome Subdistrict. It is anticipated that until chum salmon populations recover, there will be a need to continue with very restrictive measures to protect local stocks. All rivers in northern Norton Sound from the Sinuk in the west to Topkok in the east are closed to sport fishing for chum salmon, and will remain closed until runs rebuild. In addition, restrictions to the sport harvest of coho salmon in the Nome area have been necessary during recent years. Increased effort is being directed at the enumeration of coho salmon escapements in Nome area streams using tower and weir projects. Chum salmon runs have stabilized and even increased in some drainages in recent years suggesting that runs may be in the process of recovering; however, the decline in chum salmon escapement into the Niukluk River over the past five years while other drainages are showing relatively stable runs is a growing concern in the NW/NSMA.

Recent Board of Fisheries Actions

No proposals for the Nome Area salmon fisheries were adopted by the BOF at either the 2007 or 2010 meetings.

Current and Recommended Research and Management Activities

Current research and management activities on Nome roadside salmon populations are primarily conducted by the Division of Commercial Fisheries in conjunction with NSEDC's fisheries office. These groups cooperatively operate escapement enumeration projects on the Nome, Niukluk, Eldorado, Pilgrim, and Snake rivers. All projects are using weirs except the Niukluk River where a counting tower is operated by the Division of Commercial Fisheries throughout the salmon runs. The weirs direct the movement of all fish, and fish are counted as they are permitted to pass through an opening in the weir several times each day. Since 2001, a weir has been in operation through BLM, NSEDC, and/or Division of Commercial Fisheries at the outlet of Glacial Lake on the Sinuk River to enumerate sockeye salmon migrating into the lake. Recently, NSEDC in cooperation with LGL-Alaska have conducted experiments on the Fish, Niukluk, and Nome river drainages attempting to estimate coho salmon escapements using

abundance of smolt as well as measuring available freshwater fry habitat. To date, their results have shown that the relationship between smolt abundance and subsequent adult returns has been difficult to measure.

NORTHWESTERN ALASKA DOLLY VARDEN AND ARCTIC CHAR

Background and Historical Perspective

In northwestern Alaska, Arctic char occur in lakes in the Kigluaik Mountains and in some headwater lakes in the Kobuk and Noatak river drainages, while Dolly Varden are common inhabitants of most coastal streams and large rivers (Figures 2-6). Although the department typically combines Dolly Varden and Arctic char for bag limits and data collection for harvest surveys, they are two different species with distinctly different life histories. Arctic char are present only as lake resident populations, while Dolly Varden may be present as lake resident, stream resident, or anadromous populations. Arctic char distribution is very limited in northwestern Alaska and the vast majority of "char" fisheries are actually directed towards Dolly Varden.

Many residents of northwestern Alaska maintain a traditional subsistence lifestyle in which Dolly Varden comprise an important part of their traditional harvest, and in some communities they outrank salmon and whitefish in importance to the subsistence economy. The number of Dolly Varden harvested for subsistence purposes are largely undocumented in northwestern Alaska, but vastly exceeds the number taken by sport anglers. Intermittent community subsistence harvest estimates dating back to 1959 for the villages of Kivalina and Noatak (Scanlon 2008) and personal observation by the area biologist and subsistence resource specialist suggest that 15,000 to 30,000 Dolly Varden are harvested annually in this area (James Magdanz, ADF&G, Kotzebue, personal communication). In 2007, the residents of Kivalina harvested 67,739 pounds of Dolly Varden, second only to bearded seal in terms of pounds of harvested subsistence foods; and in Noatak, 33,771 pounds of Dolly Varden were harvested, second only to caribou (Magdanz et al. 2010). Fish are captured with gillnets or beach seines during open water periods and with hook and line during winter. Dolly Varden are also an important subsistence resource in Norton Sound; however, their relative importance is minor compared to salmon.

Observations and aerial surveys suggest that Dolly Varden spawner abundance is low in most rivers; however, spawning occurs in almost all drainages of Norton Sound, some northern Seward Peninsula rivers, and the major drainages of Kotzebue Sound and the Chukchi Sea. Aerial surveys of spawning Dolly Varden conducted during the mid-1980s indicated that about 9,000–12,000 spawned annually in the Noatak drainage (Table 13). Total abundance of spawning Dolly Varden in northwestern Alaska is unknown; however, partial surveys in 2002–2005 and angler reports suggested that spawner abundance in Noatak, Wulik and Kivalina river streams has declined to some degree.

Anadromous Dolly Varden make their first seaward migration at age-3 or age-4, and after moving to sea in the spring to feed during the summer, they return to freshwater each winter. Upon reaching sexual maturity at ages 6-9, they return to their home river to spawn. Each fall, nonspawning Dolly Varden return to freshwater to overwinter in mixed-stock aggregations. Some Dolly Varden stocks spawn in August, while others spawn in September or October. During summer, spawning Dolly Varden are caught in some northwestern Alaskan streams; however, most sport fisheries for Dolly Varden target overwintering populations either in the fall as they enter freshwater from the sea, or in the spring as they move toward the sea. Since

overwintering populations are composed of mixed stocks, potentially from a wide geographic area, harvests in the few rivers with good angler access have been sustainable. Harvests can be substantial in streams along the Nome road system and if similar harvests were directed towards a single stock, they would likely not be sustainable.

Movements of Norton Sound Dolly Varden are tied to those of salmon, and Dolly Varden are sometimes present in streams during summer to feed on salmon eggs, especially during years of high pink salmon abundance. They are also likely to remain in streams during the spring following a large pink salmon run in order to feed on abundant outmigrating salmon fry. The timing of the fall movement of Dolly Varden into Seward Peninsula streams has varied widely over the past 10 years resulting in annual changes in the availability of Dolly Varden to the fall fishery. Fisheries and harvests in this area follow these patterns of availability. In 1988, the BOF adopted the bag limit of 10 Dolly Varden/Arctic char per day with 10 in possession with exceptions for the Noatak, Wulik, and Kivalina rivers where only two of the 10 fish could be over 20 inches in length. In 1994, the BOF adopted the current bag and possession limits for Dolly Varden/Arctic char in the AYK region with 10 fish per day, only two $\geq$ 20 inches allowed in marine or flowing waters and two fish per day (no size limit) allowed in lakes. Due to habitat preferences, these regulations allow a liberal limit for Dolly Varden while protecting spawning fish, and a conservative limit for Arctic char (found primarily in lakes) without the need for anglers to differentiate between these two closely related species.

Drainages of Kotzebue Sound and the Chukchi Sea are known for the large size of anadromous Dolly Varden available to the sport angler. Since the inception of ADF&G's Trophy Fish Program in 1967, 135 out of 315 qualifying fish (43%) in the Dolly Varden/Arctic char category have come from the NW/NSMA. In addition, the current Alaska sport fish angling record for Arctic char/Dolly Varden (27 lbs 4 oz) was a Dolly Varden taken from the Wulik River in 2002, surpassing the previous record of 20 lbs 12 oz taken from the same river in 2000.

Abundance and size composition were estimated for Dolly Varden overwintering in the Nome River in 1991 and 1992, and the Solomon River in 1991. In addition, the movement of marked fish from the Nome River in 1991 to other rivers in 1992 was estimated (DeCicco 1992a and 1993a). These data, in combination with harvest estimates and observed changes in abundances, have been used to guide ADF&G management activities. The results indicate Dolly Varden that overwinter in a particular stream may overwinter in other streams during subsequent years. Hence, a restrictive bag limit in one stream does not necessarily protect a single stock because fish range widely and stocks mix over a broad geographic area. During the winter of 2000/2001 Dolly Varden were radiotagged in the Nome and Solomon rivers in order to document the critical wintering areas in these rivers (DeCicco 2001).

Studies in the Kotzebue Sound subarea have occurred intermittently since 1967, but in recent years have been limited to aerial index counts of spawning Dolly Varden in Noatak River tributary streams with the assistance of the NPS, and index counts of Dolly Varden overwintering in the Wulik River with the assistance of the ADF&G-Division of Habitat and the Red Dog Mine. Data on the abundance of Dolly Varden overwintering in the Wulik River will continue to be collected, in cooperation with these agencies. A genetics study was funded through the USFWS Office of Subsistence Management (OSM) to determine the relationships among stocks north and south of the Bering Strait. Results suggested that stocks in western Alaska are structured along geographic lines with good separation among stocks (Crane et al. 2005). A detailed study of a single spawning stock in the Noatak drainage was begun in 2001.

This spawning stock assessment project was completed, but high water conditions during critical times of fish movement in both 2001 and 2002 resulted in incomplete data (Scanlon 2004). In October 2003, 15 Dolly Varden were radiotagged in the Wulik River to determine movement over the course of the winter. These fish remained in the same vicinity as tagged until June 2005[1] (DeCicco *unpublished*). At that time, two fish, likely spawners, remained in the Wulik River, and one had been captured at Kivalina. The remaining radiotagged fish could not be located and it is believed that these fish had already migrated to salt water.

Recent Fishery Performance

Over the past five years (2005–2009) sport harvests of Dolly Varden/Arctic char have averaged 3,060 fish annually in the Seward Peninsula/Norton Sound subarea and 1,928 fish in the Kotzebue Sound/Chukchi Sea subarea (Table 11). The higher harvests in the Seward Peninsula/Norton Sound area are most likely because local residents have good road access to fishing areas where fish taken on rod and reel are used for food. In the Kotzebue Sound subarea, fishing sites are accessed by aircraft or raft and much of the effort is from outside the local area by anglers seeking a quality fishing experience. Estimated sport fishing effort levels in both the Seward Peninsula/Norton Sound subarea and the Kotzebue Sound subarea have been fairly consistent over the past several years. Average annual catch for 2005–2009 was 18,346 Dolly Varden in the NW/NSMA (Table 12). Estimated catches of Dolly Varden in the Seward Peninsula/Norton Sound subarea have varied from 5,700 fish in 1998 to 25,000 fish in 1991, and in 2010 the catch was 8,160 fish, of which only 1,835 were harvested (Tables 11-12). During the past five years (2005–2009), about 70% of all Dolly Varden caught in the NW/NSMA were released.

Dolly Varden harvests have been reported in most of the rivers in the Seward Peninsula/Norton Sound subarea, with highest harvests coming from the Nome, Unalakleet, and Fish/Niukluk rivers (Table 11). In the Kotzebue/Chukchi Sea subarea, the highest harvests are from the Noatak and the "other rivers" category that includes the Kivalina River.

The Wulik River is located about 90 miles north of Kotzebue and is well known as an excellent fishing destination for large Dolly Varden (Figure 5). The river is about 90 miles long and enters the Chukchi Sea through Kivalina Lagoon near the village of Kivalina. Dolly Varden from the Wulik River are heavily used for subsistence by the residents of Kivalina (Magdanz et al. 2010). Sport fishing occurs throughout the open water period, but the majority of effort and harvest occurs during late August and September when Dolly Varden return from the sea to winter in the river.

Fishery Objectives and Management

Management of Dolly Varden in Norton Sound streams is structured to maintain opportunity and allow a relatively liberal bag limit from mixed stock population aggregations. In the Kotzebue subarea, the intent is to maintain a high quality fishery with the opportunity to harvest a small number of large sized Dolly Varden (20 inches or larger) under a bag limit that protects the spawning component of the population (generally over 20 inches in length), minimizes conflicts

[1] DeCicco, A. L. *Unpublished*. Movements of overwintering Dolly Varden in the Wulik River. Alaska Department of Fish and Game, Fishery Data Series, Anchorage.

with subsistence users, and does not adversely affect the population structure. Because of the differential size structure of the population groups north and south of the Bering Strait (with Dolly Varden found north of the Bering Strait generally reaching much larger sizes and not becoming sexually mature until they reach approximately 20 inches, unlike the those found in streams below the Bering Strait), these objectives can be addressed with the same general bag and possession limit regulation of 10 fish per day with only two 20 inches or larger in length.

Current Issues and Fishery Outlook

The Wulik River is probably the most important Dolly Varden stream in northwestern Alaska, with over 100,000 anadromous Dolly Varden overwintering in some years (Table 13). The Red Dog zinc mine is located in the headwaters of this drainage and poses a potential threat to these fish and the water quality of the river. Water quality near the mine is systematically monitored to ensure that it is operated in an environmentally sensitive manner. The Red Dog Mine funds a program run by ADF&G's Division of Habitat to monitor heavy metal concentrations in receiving waters and in fish tissues. Fish tissues are sampled for heavy metals in the spring and fall each year on a continuing basis in cooperation with the DNR. The recent discovery of additional ore bodies will likely add new challenges from mineral development in this important drainage.

Dolly Varden in Norton Sound are widespread, they spawn in most rivers and overwinter in all major drainages. In the Kotzebue Sound subarea, the sport fishery is likely to grow slowly in popularity as more anglers experience these high quality-fishing opportunities. Until these fisheries grow to the point that harvests are thought to affect spawner abundance, spawner success, or population structure, it is unlikely that additional management action will be necessary. Recent aerial survey counts suggest that the population of overwintering fish in the Wulik River is stable and counts have regularly exceeded 100,000 fish. Spawning and overwintering populations will continue to be monitored in the future when possible.

Recent Board of Fisheries Actions

No proposals for the Northwest Dolly Varden/Arctic char fisheries were adopted by the BOF at either the 2004 or 2007 or 2010 meetings.

Current and Recommended Research and Management Activities

In 2012, ADF&G in cooperation with NPS and USFWS will begin a research project on Dolly Varden in the Noatak River using radiotelemetry to look for overwintering locations of nonspawning fish that enter the Noatak River in September just prior to freeze-up. Unlike the Wulik River, the Noatak River is very wide and deep in many places, making aerial surveys of overwintering fish difficult. Consequently, there is no reliable information on the number of non-spawning, overwintering fish using the Noatak each year. Based on the information learned on where major overwintering locations are, two DIDSON® side-scanning sonar units (one on each bank) will be used to enumerate the outmigration of Dolly Varden in June 2013. We will repeat the radio-tagging in September 2013 and the sonar enumeration in June 2014.

NORTHWESTERN ALASKA ARCTIC GRAYLING

Background and Historical Perspective

Sport fisheries for Arctic grayling in the NW/NSMA are relatively small when compared to the remainder of the AYK Region, with average annual harvests of 692 fish in the Seward

Peninsula/Norton Sound subarea and 521 fish in the Kotzebue/Chukchi Sea subarea from 2005–2009 (Tables 14 and 15). Even though the harvests are relatively small, Arctic grayling are the most numerous species harvested in the Kotzebue/Chukchi Sea subarea and normally the third or fourth most commonly harvested species in the Seward Peninsula/Norton Sound subarea.

The Seward Peninsula has long been known for its production of large Arctic grayling, with approximately 25% of all trophy Arctic grayling registered with the department's trophy fish program. However, many populations are quite small and since they often inhabit small streams, they must be managed as independent stocks with regulations tailored to the individual populations (or groups of similarly structured populations) to prevent overexploitation.

Since 1989, the stock status of Arctic grayling populations in several rivers where sport fishing occurs on the Seward Peninsula has been monitored (DeCicco 1990, 1991, 1992b, 1993b, 1994–1999, 2002, 2004, 2007; DeCicco and Gryska 2007; DeCicco and Wallendorf 2000; Gryska 2004, 2006, *In prep*; Gryska and Taras 2007; Joy 2006; Viavant *In prep*). The Nome River stock was found to be overexploited, while the current levels of harvest on the Niukluk, Fish, Pilgrim, Snake, and Sinuk rivers populations are believed to be sustainable. The Solomon River was found to have a very low Arctic grayling population and was closed to fishing for Arctic grayling in 1992.

Arctic grayling densities in most Seward Peninsula rivers are low. They generally range from about 40 to 60 fish per mile in the Nome and Sinuk rivers, to about 200 fish per mile in the Pilgrim River. Densities in the Niukluk and Fish rivers are higher at about 470 and about 500 fish per mile, respectively (DeCicco 2002; Viavant *In prep*). In contrast, Interior Alaska Arctic grayling populations often exceed 500 fish per mile (Ridder et al. 1993; Ridder 2000). Arctic grayling from rivers on the Seward Peninsula are large in general, and are generally older and larger when they first spawn than Arctic grayling in Interior Alaska streams. Arctic grayling from the Snake River were found to be 50% mature at 307 mm FL and 99% mature at 404 mm FL (DeCicco and Gryska 2007). Arctic grayling from northwestern Alaska can live for more than 20 years and one fish from the Eldorado River was determined to be approximately 29 years using otolith analysis. Some Arctic grayling may survive to grow very large, particularly in rivers where fishing effort is light. For example, in the lightly exploited Sinuk River, almost 70% of the 1991 sample was age-8 or older and the average total length of all fish sampled was over 457 mm (Joy 2006).

Arctic grayling occur in almost all streams and in many of the lakes in the Kotzebue area, but most are inaccessible by road and therefore, lightly exploited. Most Arctic grayling in this area are caught in association with wilderness float trips or as an alternate species in trips directed toward fishing for Dolly Varden or sheefish. From 2005–2009, the estimated harvest rates have only been about 10% of the total caught (Table 15).

Prior to 1988, the bag limit for Arctic grayling in the NW/NSMA was 15 fish, only two of which could be 20 inches or larger. In 1988, the BOF established a separate bag and possession limit for Arctic grayling in Northern Norton Sound of five per day, with only one 15 inches or larger. The effect of this change is reflected in harvest estimates that averaged about 4,300 Arctic grayling annually from 1980–1988, but dropped to about 1,550 from 1990 to 2000. This regulatory change likely resulted in the nearly doubling of the Arctic grayling populations in the Fish and Niukluk rivers when compared to estimates from the early 1990s (Gryska and Taras 2007; Viavant *In prep*).

Recent Fishery Performance

Seward Peninsula/Norton Sound Subarea

Estimated harvests of Arctic grayling by sport anglers in the Seward Peninsula/Norton Sound subarea have declined since 1991 when harvest peaked at 5,121 fish. From 2005–2009, harvests averaged 692 fish per year (Table 14).

The estimated catch of Arctic grayling fluctuates greatly from year to year ranging from approximately 4,000 to 15,000 fish during the past 10 years. Catch-and-release appears to be a prevalent practice in the Seward Peninsula/Norton Sound subarea with average catch retention for Arctic grayling of only 10% from 2000–2009.

Current exploitation rates on most northwestern Alaska Arctic grayling populations are unknown, but since most are in remote areas, exploitation is believed to be light. Some estimates of exploitation in Nome area roadside streams are available by combining harvest data with abundance data. Based on this information, exploitation rates of Arctic grayling were estimated to range from 10% to 20% in some streams during the early 1990s. More recent estimates for the Niukluk and Fish rivers suggest that annual exploitation in these streams has been less than 5% over the past 10 years. In addition, guided anglers caught a total of 9,533 Arctic grayling in the Seward Peninsula/Norton Sound subarea from 2006–2010, yet harvested just 53 fish (Sigurdsson and Powers 2009–2011). These data suggest a change in angler motivation away from harvest as a primary reason for fishing.

Kotzebue Subarea

In the Kotzebue/Chukchi Sea subarea, Arctic grayling harvests from 2005–2009 have ranged between 270 and 800 fish (Table 15). Catches over the same period have ranged quite widely from about 2,900 in 2005 to about 7,100 in 2009. In 2010, the harvest and catch was 366 and 4,201 fish, respectively. The percentage of catch that was harvested has ranged from 8% in 1991 to 19% in 2004, and has averaged about 10% annually over the past five years (Table 15). Most Arctic grayling from this subarea are harvested in association with float trips or while fishing for other species. It is likely that harvests will remain relatively stable until participation in this subarea increases significantly.

Fishery Objectives and Management

Research on the status of resident Arctic grayling populations in the rivers accessible from the road system in northern Norton Sound has been ongoing for approximately 20 years. Arctic grayling in northwestern Alaska may live for more than 20 years and attain a large size. Data on population abundance, age, and size composition by river throughout this period has allowed the development of regulations tailored to individual rivers or groups of rivers that share population characteristics. Overall management objectives for these Arctic grayling populations are to maintain a given abundance of fish ≥15 inches in length in populations, and to allow for population recovery in systems that have been stressed by overexploitation. The background bag and possession limits are five fish per day with only one fish 15 inches or larger. This bag limit is appropriate for drainages with Arctic grayling populations that have characteristics of lightly exploited populations. These characteristics include large average size and a high proportion of sexually mature fish that are 7 years of age or older in the population. Abundance is directly related to the river's size and flow characteristics; therefore, both abundance and population density may vary by river. Rivers that share these characteristics and regulations include the

Fish/Niukluk River system, and the Eldorado and Sinuk rivers. On the other extreme are overexploited populations where abundance is very low. Rivers like the Nome and Solomon are in this category. These rivers are closed to all fishing for Arctic grayling.

Populations intermediate between these two categories include those in the Pilgrim and Snake rivers. These populations contain a smaller proportion of sexually mature fish, have been impacted somewhat by harvest, but Arctic grayling are still relatively abundant and populations appear stable. In these rivers the regulations allow harvest of two Arctic grayling per day with only one over 15 inches. Populations are assessed periodically to estimate whether they are maintaining desired characteristics. Recent stock assessments of Arctic grayling populations in road accessible waters suggest that the current management approach is working, and that population size and size compositions are being sustained.

Management objectives have not been developed for remote Arctic grayling waters of the remainder of the Seward Peninsula or the Kotzebue subarea. Anglers rarely visit these waters and populations are presumed to be unexploited. The general regulations for these waters provide for a bag and possession limit of five fish with no size limits. Until effort and harvests increase dramatically, it is likely that regulations will remain unchanged.

In 2004, the *Wild Arctic Grayling Management Plan* (5 AAC 70.055) was adopted. The plan created three management approaches with associated regulatory options: regional, conservative, and special management. The regulations adopted under the regional management approach (five fish bag and possession limit, season open year round) did change the general Arctic grayling regulations in the NW/NSMA from 10 to five fish, with the exceptions of the Dalton Highway Corridor, Northern Norton Sound, and the Unalakleet River drainage which already had bag limits of five fish and those fisheries classified under the conservative and special management approach. The Snake and Pilgrim rivers are classified under the conservative management approach, and the Nome and Solomon rivers are classified under special management.

Current Issues and Fishery Outlook

There is concern on the part of the public and ADF&G staff that populations of Arctic grayling in the vicinity of Nome that are road accessible, especially the Nome and Solomon rivers, have been overexploited and may not recover for many years. The abundance of fish ≥15 inches has declined since 1999 (DeCicco 2007). The Nome River population has shown little change in abundance over the past several years. An experimental restoration project in 1998 to increase survival of young-of-the-year Arctic grayling by rearing them in a gravel pit failed (DeCicco 2004). Additional restoration efforts were conducted more recently using a different rearing pond, and in 2002 and 2003, a total of 1,574 pen-reared Arctic grayling were released into the Nome River. The population was re-assessed in 2005 to estimate the abundance and contribution of pen-reared fish into the Nome River. Although the number of small fish captured was insufficient to estimate abundance, more were captured than in past assessments, indicating that there may be an increase in smaller Arctic grayling in this river. By 2009, it was believed that these fish should be large enough to be recruited to the sampling gear for a stock assessment to estimate abundance. In June 2009, catches were so low that samples sizes were not met in order to estimate abundance. Other road accessible populations would be vulnerable to overexploitation if fishing practices and motivations were to change; however, at this time other populations appear to be stable, and are able to sustain the current low levels of effort and harvest.

Northwestern Alaska, particularly Seward Peninsula waters, provides some of the best opportunities in the state to capture large-sized Arctic grayling. Under the current regulations, it appears that maintaining the quality of these fisheries is favorable. Populations in the Fish and Niukluk rivers have recovered from relatively low levels of abundance in the early 1990s, and the outlook in these rivers is promising. Populations in both the Pilgrim and Sinuk River are slightly larger than when last assessed and appear to be sustaining current levels of exploitation, and the population in the Pilgrim River appears stable.

Recent Board of Fisheries Actions

No actions were taken specific to NW/NSMA Arctic grayling fisheries at the 2007 or 2010 BOF meetings.

Current or Recommended Research and Management Activities

A management plan is being updated to specifically address Nome roadside Arctic grayling fisheries using bag and possession limits based on specific threshold abundances, in addition to the use of precision criteria for estimates of abundance generated from future stock assessments (Scanlon *In prep*).

KOTZEBUE SOUND SHEEFISH

Background and Historical Perspective

Within the NW/NSMA, spawning stocks of sheefish occur only in the Kobuk and Selawik rivers (Alt 1975) with the exception of a small population that resides in the Koyuk River of Norton Bay. Sporadic catches of sheefish have been recorded in the Serpentine River upstream of Shishmaref, but it is not known if they spawn there (Jim Magdanz, ADF&G, Kotzebue, personal communication).

The drainages of Kotzebue Sound are known for the large size of sheefish that are available to the sport angler. These remote high quality sport fisheries are considered by many to be among the pinnacle of Alaskan freshwater sport fishing. Since the inception of ADF&G's Trophy Fish Program in 1967, all but one of the qualifying sheefish has come from the Kobuk River.

Kotzebue Sound sheefish are distributed throughout the nearshore estuarine areas of Kotzebue Sound. The major concentration occurs in Hotham Inlet, but also occurs in the Sheshalik and Krusenstern areas and in southern Kotzebue Sound (Figure 5). Nearly all sheefish occupying the estuarine environment during summer are immature or nonspawning adults. Adult prespawning fish move upstream during summer on the Kobuk and Selawik rivers to spawn in the fall. The Kobuk River stock spawns upstream from the village of Kobuk, with the greatest observed concentrations between the Mauneluk River and Beaver River. After spawning is complete in late September or early October, fish disperse to downstream overwintering areas. Tag recoveries have shown that the two stocks mix in Hotham Inlet winter habitats, but maintain fidelity to their spawning areas.

Kotzebue Sound sheefish support subsistence, commercial, and sport fisheries. Subsistence fishing is given priority and is currently unrestricted, with little reliable harvest reporting. The commercial fishery and much of the subsistence harvest takes place through the ice while sport fisheries are mainly summer and fall activities. The same populations of sheefish contribute to all harvests. The annual commercial sales of sheefish in Kotzebue have ranged from 20 to 850 fish since 1991 (Georgette and Shiedt 2005). The estimated subsistence harvest in the villages of

the Kobuk River averaged about 6,700 fish from 2000–2004 (Table 16). All villages were not surveyed during 2001 and 2002, so the harvest estimate should be considered a minimum. In 2004, the subsistence sheefish harvest was estimated at 10,163 fish (Table 16). These surveys were not conducted from 2005–2010. Since subsistence practices have not changed appreciably in recent years, it is likely that Kobuk River subsistence harvests reflect trends in the spawning population of sheefish. Winter gillnet harvests from the fishery near Kotzebue were estimated at about 15,000 fish in 1995/1996 and 14,000 fish in 1996/1997 (Taube and Wuttig 1998). During the winter of 2000/2001, a complete census of participants in the winter fishery documented the harvest at 14,533 fish (Savereide 2002). Sheefish are also taken by jigging lures under the ice in Hotham Inlet and Selawik Lake, but harvests are undocumented. Overall it is likely that 15,000–25,000 sheefish are taken for subsistence annually in northwestern Alaska.

The Division of Sport Fish conducted studies of the ecology, movements, and growth of sheefish between 1966 and 1979. Much of this work was conducted in northwestern Alaska and was summarized by Alt (1987). After conducting a feasibility experiment in 1994, ADF&G Division of Sport Fish, in cooperation with the NPS, began a project to estimate abundance of sheefish spawning in the Kobuk River. This project continued through 1997 and established baseline estimates on spawner abundance, age, size, and sex composition of the spawning population. Tag recovery data indicated that although some sheefish were capable of spawning in consecutive years, most spawned every other year. However, more recent results from radiotelemetry research conducted on the Kobuk River sheefish population showed that 44% of spawners tagged in 2008 returned to spawn in 2009, with returning males outnumbering females 3:1 (James Savereide, ADF&G, Fairbanks, personal communication). Spawner abundance in the Kobuk River was estimated at approximately 32,000 fish in 1995, 43,000 fish in 1996 and 33,000 fish in 1997 (Taube and Wuttig 1998). The USFWS (Underwood et al. 1998) estimated the abundance of sheefish spawning in the Selawik River at 5,200 fish in 1995 and 5,150 fish in 1996. Anecdotal reports based on catches by residents of Kotzebue, Sheshalik, and Kobuk River villages indicate that there are more sheefish now than ever in the last 25 years. The USFWS repeated abundance estimates in the Selawik River in 2004 and 2005. Estimates indicated that the spawner abundance was approximately 24,000 fish in 2004 and 46,000 fish in 2005 (Hander et al. 2008). Most of the increase was in the smaller size classes of spawners and indicates strong recruitment into the spawning population. If similar increases are occurring in the Kobuk stock, the anecdotal reports of high sheefish abundance are indeed correct.

Most sheefish sport fishing effort in the NW/NSMA occurs on the Kobuk River spawning population. Most of the areawide subsistence and the commercial harvest of sheefish occur on the entire (spawners and nonspawners) population. When taken in combination, recent annual sport harvests of about 650 fish are easily sustainable (Table 17). Although spawner abundances have been estimated, the total size of the areawide population is not known and the sport harvest must be viewed in relation to other ongoing harvests. It was always assumed that subsistence harvests are much greater than either commercial or sport harvests, and recent data support this assumption. In order to ensure sustained yields from these population(s), a management approach involving the subsistence and commercial fisheries for sheefish is recommended. Sheefish are very fecund fish with some large females containing over 400,000 eggs. Such populations may be subject to episodic recruitment events depending on environmental conditions. If spawner abundances are maintained above some threshold level, intermittent years of good recruitment should carry the population through years when environmental conditions are less favorable.

Recent Fishery Performance

Estimated annual sport harvests of sheefish by anglers in northwestern Alaska since 1990 have fluctuated from a high of about 2,500 fish to a low of about 60 fish with an average annual harvest of 655 fish from 2005–2009 (Table 17). The sport harvest in 2007 was 1,066 fish and in 2008 the harvest dropped to 61 fish, all of which were taken in saltwater, but in 2009 the harvest went back up to 946 fish. In 2010, the harvest was 595 fish and the catch was 2,928 fish (Table 17). Estimates of sheefish catch from 2005–2009 was 2,694 fish, indicating that about 75% of all sheefish captured in northwestern Alaska by sport anglers are released. In a 1997 experiment to determine hooking mortality rates of sheefish in the Kobuk River, the mortality of fish caught and released on sport fishing gear was found to be low (3.3% for treble hook lures and 1.7% for single hook lures; Stuby and Taube 1998). Overall mortality was 2.4%. The Kobuk River is the most popular sheefish destination in Alaska and people from the world over go there to fish for this unique species (Jennings et al. 2011b; Sigurdsson and Powers 2011). In spite of the worldwide reputation of this destination, the level of fishing effort is still quite low. The five-year (2005–2009) average effort on the Kobuk River was 2,193 angler-days (Table 4). The Kobuk River accounted for about 28% of the overall estimated freshwater sport fishing effort in the Kotzebue subarea (3,470 total angler-days) in 2010 (Table 4).

Fishery Objectives and Management

The Kobuk River sheefish fishery is managed to maintain opportunity to participate in this unique high-quality sport fishery while keeping harvests from spawning areas low. In order to accommodate local use of this resource downstream from major spawning areas, the bag limit is 10 sheefish downstream of the Mauneluk River. In the spawning area upstream of the Mauneluk River, the bag and possession limit is two fish. The majority of anglers visiting the Kobuk River to fish for sheefish use the area upstream of the Mauneluk River. The Selawik River has similar regulations, with the bag and possession limit of 10 sheefish downstream of the Tagagawik River, and a bag and possession limit of 2 sheefish upstream of this tributary.

Current Issues and Fishery Outlook

Alaska Native residents of Kobuk River villages have expressed concern over some practices of sport anglers on the Upper Kobuk River in the vicinity of the sheefish spawning grounds. Catch-and-release fishing is considered by some local residents to be disrespectful and damaging to the fish. Discarding filleted carcasses in the water is thought by some to drive other sheefish away from the area. Catch-and-release fishing is viewed as a conservation tool by ADF&G and by many anglers, and although sheefish may be sensitive to rough handling, the department has demonstrated that they can be released without significant mortality. An educational brochure explaining proper catch-and-release techniques for sheefish has been developed in association with the NPS, and has been made available to those fishing on the Upper Kobuk River. It is hoped that with proper handling, impacts of catch-and-release fishing to the spawning population can be minimized.

The outlook for sheefish fisheries in northwestern Alaska is good in the immediate future. Although overall harvest levels are substantial, populations and spawner abundances appear stable and sport harvests are low.

Recent Board of Fisheries and Management Actions

No proposals were submitted specific to the Northwest Area sheefish fisheries for the 2007 and 2010 BOF meetings.

Current or Recommended Research and Management Activities

The department believes that recent research conducted cooperatively with the USFWS and the NPS has provided substantial background data on spawner abundance for the two stocks comprising the Kobuk-Selawik sheefish population. These data will be used as a baseline for comparing future population assessments. In 2008, ADF&G, in cooperation with USFWS, began a five-year study on the Kobuk River sheefish population using radiotelemetry to determine spawning locations, spawning frequency, and timing of outmigration of post-spawners to Hotham Inlet.

In 2011, USFWS began a study to look at the genetic composition of the wintertime subsistence harvest in Hotham Inlet, specifically to see what proportion is from the Selawik River stock and what proportion is from the Kobuk River (Ray Hander, USFWS, Fairbanks, personal communication).

In 2004, a permafrost slump located approximately 50 km upstream from the Selawik River spawning area for sheefish began to emit a large amount of silt in the river and continues to erode during the open water season. It has been speculated that the effects could potentially impact the spawning success on sheefish in the Selawik River by clogging interstitial spaces in the gravel and cobble substrate where fertilized eggs are thought to settle and develop through the winter (Waters 1995). In fall 2011, USFWS initiated an experiment to look for any effects of the thaw slump on the recruitment and survival of eggs deposited after the slump occurred and results are not yet available (Ray Hander, USFWS, Fairbanks, personal communication).

NORTH SLOPE DOLLY VARDEN AND ARCTIC CHAR

Background and Historical Perspective

In the North Slope subarea of the NW/NSMA, Arctic char occur in lakes on the north-facing side of Brooks Mountain Range, while the closely-related Dolly Varden are common inhabitants of most large rivers on the North Slope in most drainages of the eastern coastal plain from the Canadian Border to the Colville River. The two species have distinct life history traits; however, the department groups Dolly Varden and Arctic char together for regulatory purposes, primarily because of the difficulty of distinguishing between the two based solely on physical appearance. Distribution of Arctic char is limited in the North Slope subarea and essentially all the fisheries are directed toward Dolly Varden.

Dolly Varden are a major component of the harvest and catch in the North Slope area contributing more than 33% of the harvest and 25% of the catch for the primary sport species during from 2000–2009 (Table 18). On the North Slope most sport fisheries for char target overwintering populations of Dolly Varden either in the fall as the fish return to freshwater from the sea or in the spring as they move toward the sea to feed, although some prespawning fish are caught in late summer.

On the North Slope, Dolly Varden spawn and overwinter in upwelling areas. Dolly Varden become increasingly concentrated in the spring areas beneath and adjacent to the inriver glaciers (aufeis) that form during winter. Streams that are known to support significant populations of

Dolly Varden in the North Slope subarea include the Ivishak, Kongakut, Hulahula, Canning, Sagavanirktok, and Anaktuvuk rivers (Figure 6). Overwintering locations are, in some cases, different from spawning locations such that non-spawning fish from several neighboring tributaries may concentrate in a single drainage. The Upper Ivishak River, a tributary of the Sagavanirktok River provides a large overwintering area used by fish in non-spawning years from nearby tributaries such as the Ribdon, Lupine, and Echooka rivers.

The population of Dolly Varden using the Sagavanirktok River is considered particularly vulnerable because of potential habitat degradation resulting from oil and gas development that has occurred in Prudhoe Bay (Sagavanirktok River Delta). Access for anglers to the migratory route of this stock is provided by the Dalton Highway which parallels most of the mainstem of the Sagavanirktok River. In 1994, the entire length of the Dalton Highway was opened to public travel. Prior to this, the North Slope portion of the road was technically open only as far north as the Wiseman area in the Upper Koyukuk drainage.

Aerial surveys of index areas in several North Slope rivers have been conducted since 1971 to monitor the Dolly Varden stocks (Table 19). Research conducted by ADF&G, funded by USFWS-OSM, from 2001–2003 using radiotelemetry, mark-recapture abundance estimates, and aerial surveys demonstrated that aerial surveys of overwintering aggregations of Dolly Varden in North Slope drainage can be used as an indicator of overwintering abundance (Viavant 2001–2003, 2005, 2008, 2009).

A large increase in fishing effort and catch of Dolly Varden, and the other two key sport species (Arctic grayling and lake trout), was anticipated with the opening of the entire length of the Dalton Highway to public travel in 1994 and again, with the improvement of the roadway south of Atigun Pass in 2001 and 2002. Estimates from the SWHS do not indicate that this has occurred (Table 18).

Recent Fishery Performance

Estimates of catch and harvest of Dolly Varden from the North Slope subarea suggest a stable level of use. Total average annual catch has been about 3,100 fish and average harvest about 600 fish from 2000-2009 (Table 18). In 2010 harvest was estimated to be just 223 Dolly Varden, with a total catch of 3,010 fish. Historically, about 40% of the total catch and harvest of Dolly Varden has come from waters adjacent to the Dalton Highway.

Fishery Objectives and Management

Fishery management for Dolly Varden and Arctic char reflects the different life history characteristics that these two closely related species exhibit. Dolly Varden (which inhabit streams and are often anadromous) can be exploited at much higher rates than can lake-dwelling Arctic char. The life history characteristics of lake-dwelling Arctic char are very similar to lake trout and it is likely that most of these populations can support only low rates of exploitation.

In lakes, Arctic char are managed to provide a conservative level of yield. In streams, Dolly Varden are managed to encourage participation in the fishery while limiting harvest of spawning adults.

Current Issues and Fishery Outlook

There is a concern among indigenous people of the North Slope that a growing sport fishery for Dolly Varden may conflict with local subsistence fisheries.

Oil and gas development adjacent to and within the migration routes of Dolly Varden in North Slope waters carries the potential for serious impacts through contamination or alteration of habitat. Dolly Varden using the Sagavanirktok River drainage pass through Prudhoe Bay, one of the most heavily industrialized areas in Alaska. Current plans for oil and gas leases in the foothill region of National Petroleum Reserve-Alaska are of particular concern. These new lease areas include the critical overwintering/spawning habitat in the spring areas of the Anaktuvuk River drainage. Seismic surveys are planned for the portions of the Sagavanirktok, Anaktuvuk, and Canning rivers that are the primary spawning and overwintering habitats for these Dolly Varden stocks. Department staff continues to assert that these critical habitats must be excluded from all surface development and that travel routes be redirected.

Recent studies in the Sagavanirktok River drainage (Viavant 2005) indicated a declining abundance of overwintering and spawning Dolly Varden. Fluctuations in the abundance of Dolly Varden stocks on the North Slope have been reported before (Yoshihara 1973; Bendock and Burr 1984), but not of this magnitude.

The results from the radiotelemetry study show that the specific locations of critical spawning and overwintering habitat used by anadromous Dolly Varden in the Beaufort Sea drainages may change significantly between years within a relatively large area within a drainage (Viavant 2003). Protection of such habitat should not be based on locations determined from only one or a few seasons.

Dolly Varden will likely continue to provide a substantial portion of the sport fishery that occurs on the North Slope. The waters within the Dalton Highway corridor will continue to support most of the total catch and harvest of Dolly Varden in the North Slope subarea. Increased numbers of visitors are reportedly floating streams (Kongakut, Hulahula, Canning rivers) in ANWR. Modest increases in catch and harvest of Dolly Varden can be anticipated with the increased visitor use of the area.

Recent Board of Fisheries Actions

No proposals were submitted specific to the North Slope Dolly Varden/Arctic char fisheries for the 2007 and 2010 BOF meetings.

Current or Recommended Research and Management Activities

Establishment of annual aerial index counts of the Ivishak and Anaktuvuk rivers overwintering areas is recommended. Annual monitoring of these stocks is important, particularly in light of apparent declining abundance of Dolly Varden in the area and the increased oil and gas development activity in this area.

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TABLES AND FIGURES

Table 1.–Commercial salmon harvest from the Norton Sound and Kotzebue districts, 1991–2010.

	Norton Sound					Kotzebue	
Year	King	Sockeye	Coho	Pink	Chum	Chum	Dolly Varden
1991	6,068	204	63,647	0	86,871	239,923	6,136
1992	4,541	260	105,418	6,469	84,971	289,184	1,977
1993	9,971	265	42,098	157,574	54,413	73,071	76
1994	5,285	77	102,140	982,389	18,578	153,452	149
1995	8,860	124	47,863	81,644	43,268	290,730	2,090
1996	4,984	0	68,206	487,441	10,631	82,110	188
1997	12,573	161	32,284	20	34,103	142,720	3,320
1998	7,429	7	29,623	588,043	16,324	55,907	349
1999	2,508	0	12,662	0	7,881	138,605	1,502
2000	752	14	44,409	166,548	6,150	159,802	7
2001	213	43	19,492	0	11,100	211,662	0
2002	5	1	1,759	0	600	8,390	0
2003	12	0	17,058	0	3,560	25,423	20
2004	0	40	54,750	0	7,668	51,038	124
2005	151	280	85,255	0	3,983	75,971	181
2006	12	3	130,808	0	10,042	130,660	0
2007	19	2	126,115	3,769	22,431	147,087	0
2008	83	60	120,293	75,384	25,124	190,550	1,629
2009	84	126	87,041	17,364	34,122	187,562	960
2010	140	103	62,079	31,557	117,743	270,343	1,323
2000–2009 Average	**133**	**57**	**68,698**	**26,307**	**12.478**	**118,815**	**292**
2005–2009 Average	**70**	**94**	**109,902**	**19,303**	**19,140**	**146,366**	**554**

Table 2.–Salmon escapement goals and documented salmon escapements in Norton Sound, 2000–2010.

River/Fish	Escapement Goal	Type	Year										
			2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Nome River													
Chum	2,900-4,300	SEG-Weir	4,056	2,859	1,720	1,957	3,903	5,677	4,128	7,034	2,607	1,565	5,906
Pink	>13,000 (even yrs)	SEG-Weir	41,673	3,138	35,057	11,402	1,051,146	285,759	611,550	24,395	1,186,554	16,490	171,760
Coho			696	2,418	3,418	548	2,283	5,848	8,307	2,437	4,605	1,370	4,114
Snake River													
Chum	1,600-2,500	SEG-Weir	1,911	2,182	2,669	2,179	2,145	2,967	4,128	8,147	1,224	891	6,973
Pink			4,723	1,295	4,042	2,829	126,917	13,813	73,734	4,634	145,761	769	51,099
Coho			406	1,335	396	489	474[a]	2,925	4,926	1,781	5,206	50	2,243
Eldorado River													
Chum	6,000-9,200	SEG-Weir	11,617	11,635	10,260	3,589	3,273	10,426	41,985	21,312	6,746	4,983	21,211
Pink			55,992	488	115,652	173	60,861	12,356	22,368	833	244,641	1,119	48,316
Coho			192	1,509	516	115	1,149	679	523	2	38	2	2
Pilgrim River													
Chum			861	ND	5,538	15,192	10,228	9,715	45,410	35,334	25,008	5,427	25,379
Pink			374	ND	3,870	14,100	50,757	13,298	18,701	3,616	92,641	483	29,237
Coho			21	ND	216	677	1,556	304	962	605	260	18	272
Sockeye (Salmon Lake)	4,800-9,600	SEG-Aerial	12,141	ND	4,012	42,729	85,520	56,484	52,223	43,432	20,448	953	1,654
Niukluk River													
Chum	23,000	SEG-Tower	30,662	33,999	20,018	10,158	10,791	25,596	29,199	50,994	12,078	15,879	48,561
Pink	>10,500	SEG-Tower	961,603	41,625	636,404	75,855	1,022,302	270,424	1,371,919	43,617	669,234	24,201	434,205
Coho	2,400-6,100	SEG-Tower	11,382	3,468	7,269	1,282	1,833[b]	2,727	11,169	3,498	13,779	6,861	9,042
North River													
King	1,200-2,600	SEG-Tower	1,046	1,337	1,484	1,452	1,105	1,019	906	1,950	903	2,355	1,256
Chum			4,971	6,515	5,918	9,859	9,624	11,984	5,385	8,046	9,502	8,739	16,131
Pink	>25,000	SEG-Tower	69,703	24,737	321,756	280,212	1,149,294	1,670,934	2,169,890	583,320	240,286	42,960	150,807
Coho			6,959	12,383	2966b	5,837	9,646	19,189	9,835	19,965	15,648	22,226	7,608

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Table 2.–Page 2 of 2.

River/Fish	Escapement Goal	Type	Year										
			2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Kwiniuk River													
King	300-550	SEG-Tower	144	261	1,632	749	645	342	195	258	237	444	135
Chum	10,000-20,000	BEG-Tower	12,897	16,598	37,864	12,117	10,371	12,083	39,519	27,756	9,462	8,739	71,388
Pink	>8,400	SEG-Aerial	750,173	8,423	1,114,616	22,332	3,045,915	341,048	1,347,090	54,255	1,442,237	42,960	634,220
Coho	650-1,300	SEG-Aerial	2b	9,531	6,459	5,484	10,523	12,950	22,341	9,429	10,680	9,036	8,049

[a] Incomplete count because of high water; 1,916 coho salmon counted by aerial survey in the Snake River.

[b] Incomplete count because of high water or tower not run through end of season.

Table 3.–Subsistence salmon harvest in the Norton Sound, Port Clarence, and Kotzebue Districts, 1991–2010.

	Norton Sound						Port Clarence						Kotzebue
Year	King	Sockeye	Coho	Pink	Chum	Total	King	Sockeye	Coho	Pink	Chum	Total	Chum
1991	395	166	3,432	3,749	6,375	14,117	ND	ND	ND	ND	ND	ND	14,740
1992	252	163	2,762	13,503	2,944	19,624	ND	ND	ND	ND	ND	ND	14,303
1993	420	80	3,287	2,599	3,401	9,787	ND	ND	ND	ND	ND	ND	15,430
1994	7,375	1,162	22,124	71,065	25,120	126,846	ND	ND	ND	ND	ND	ND	36,226
1995	7,284	3,595	21,620	38,134	41,259	111,892	181	1,979	1,692	3,849	2,042	9,743	102,881
1996	7,255	1,181	26,305	64,724	34,586	134,051	76	4,481	1,739	3,293	6,011	15,600	99,740
1997	8,903	1,045	14,505	24,549	25,249	74,251	195	4,558	2,079	2,587	1,264	10,683	57,906
1998	6,242	393	13,743	46,480	14,010	80,868	158	3,177	829	755	2,099	7,018	48,980
1999	4,331	866	12,233	19,193	13,049	49,672	287	1,665	1,759	7,812	2,621	14,144	94,342
2000	3,690	324	13,455	37,864	12,989	68,322	89	2,392	1,030	786	1,936	6,233	65,975
2001	4,751	750	11,293	29,822	13,963	60,579	72	2,851	935	1,387	1,275	6,520	49,232
2002	4,792	443	11,773	56,311	13,095	86,414	74	3,692	1,299	1,183	1,910	8,158	16,880
2003	4,728	522	11,446	46,336	9,498	72,530	133	3,732	2,194	3,394	2,699	12,152	19201
2004	4,419	458	10,892	70,945	3,592	90,306	177	4,495	1,434	4,113	2,430	12,649	24,637
2005	4,848	914	16,127	60,427	13,765	96,081	276	8,288	1,031	5,817	2,501	17,913	10,616
2006	2,876	572	17,242	56,579	5,992	83,261	152	8,492	726	6,615	2,479	18,464	ND
2007	2,646	938	12,023	21,039	12,048	48,694	85	9,484	705	1,468	4,454	16,196	4,568
2008	2,465	363	17,604	54,927	8,709	84,068	125	5,166	562	7,652	2,517	16,022	ND
2009	4,222	394	17,121	26,610	11,337	60,384	40	1,643	804	1,882	3,060	7,429	ND
2010	2,120	546	11,863	42,254	16,201	72,987	63	824	596	5,202	5,232	1,197	ND
2000–2009 Average	**3,944**	**568**	**13,898**	**46,086**	**10,499**	**75,064**	**122**	**5,024**	**1,072**	**3,430**	**2,526**	**12,174**	**27,301**
2005–2009 Average	**3,411**	**636**	**16,023**	**43,916**	**10,370**	**74,498**	**136**	**6,615**	**766**	**4,687**	**3,002**	**15,205**	**7,592**

Table 4.–Sport fishing effort (angler-days) by major fisheries and subareas in the NW/NSMA, 1991–2010.

	Seward Peninsula/Norton Sound Sub-Area								Kotzebue/Chukchi Sea Sub-Area					North Slope Sub-Area			NW/NSMA
Year	Nome	Fish/Niukluk	Unalakleet	Snake	Sinuk	Pilgrim	Other	Total	Noatak	Kobuk	Wulik	Other	Total	Haul Road	Other	Total	Total
1991	4,646	2,524	5,616	2,384	885	3,183	5,269	23,622	4,235	2,353	93	2,862	9,543	3,535	3,756	7,291	40,456
1992	6,455	2,742	2,433	2,379	1,504	1,184	7,491	22,684	2,611	2,095	469	970	6,145	2,211	2,729	4,940	33,769
1993	3,633	3,962	2,153	1,468	874	1,195	6,519	18,930	3,013	2,604	350	1,842	7,809	3,421	2,179	5,600	32,339
1994	5,116	3,082	2,349	880	1,132	808	6,651	18,922	2,747	1,153	762	1,374	6,036	2,926	2,481	5,407	30,365
1995	3,044	2,603	3,832	1,968	1,295	717	6,947	19,647	2,504	3,681	647	1,663	8,495	3,275	2,369	5,644	33,786
1996	2,920	2,120	2,539	1,269	553	840	4,095	13,783	2,039	1,358	274	1,900	5,571	2,700	1,787	4,487	23,841
1997	1,914	3,017	4,393	445	443	820	3,261	13,850	1,159	825	553	1,192	3,729	3,224	2,054	5,278	22,857
1998	1,371	1,344	3,795	376	123	546	6,184	13,616	765	2,053	202	781	3,801	2,121	1,532	3,653	21,070
1999	1,463	4,825	4,176	977	244	433	3,041	14,915	3,142	2,099	737	793	6,771	2,473	2,757	5,230	26,916
2000	1,455	3,324	6,201	397	294	747	3,385	15,509	1,713	2,298	336	878	5,225	2,325	2,414	4,739	25,473
2001	1,045	2,484	2,793	853	490	491	1,899	9,565	2,702	925	592	1,275	5,494	4,256	1,776	6,032	21,091
2002	1,901	1,646	8,195	514	1,324	562	3,604	16,422	1,218	3,286	610	1,171	6,285	2,224	3,808	6,032	28,739
2003	651	2,273	3,056	701	430	730	4,810	12,221	1,855	2,039	397	1,830	6,121	1,103	1,607	2,710	21,052
2004	1,636	2,786	4,527	468	466	594	2,393	12,404	1,130	2,760	219	1,246	5,355	873	2,438	3,311	21,070
2005	2,142	1,954	4,768	836	549	327	5,044	15,071	1,310	868	493	393	3,064	1,881	2,471	4,352	22,487
2006	4,517	1,049	4,062	855	1,234	337	4,010	14,830	2,538	2,104	993	699	6,334	1,298	1,806	3,104	24,268
2007	3,887	1,483	4,205	1,873	933	240	4,979	16,667	2,935	1,627	205	260	5,027	799	3,355	4,154	25,848
2008	5,272	3,842	5,129	1,740	878	590	5,422	21,995	1,621	1,183	395	1,222	4,421	3,774	1,825	5,599	32,015
2009	2,808	3,813	5,329	564	447	482	4,004	17,000	2,561	3,283	428	1,159	7,431	1,813	2,092	3,905	28,336
2010	2,326	1,844	3,012	1,032	616	248	1,532	10,610	745	955	334	1,436	3,470	3,724	660	4,384	18,464
2000–2009 Avg.	**2,531**	**2,465**	**4,827**	**880**	**705**	**510**	**3,955**	**15,168**	**1,958**	**2,037**	**467**	**1,013**	**5,476**	**2,035**	**2,359**	**4,394**	**25,038**
2005–2009 Avg.	**3,725**	**2,428**	**4,699**	**1,174**	**808**	**395**	**4,692**	**17,113**	**2,193**	**1,813**	**503**	**747**	**5,255**	**1,913**	**2,310**	**4,223**	**26,591**

Table 5.–Sport fish harvest by species in the NW/NSMA, 1991–2010.

Year	King Salmon	Coho Salmon	Pink Salmon	Chum Salmon	Sockeye Salmon	Dolly Varden/ Arctic Char	Lake Trout	Arctic Grayling	Northern Pike	Whitefish	Sheefish	Burbot
1991	404	5,205	1,758	1,474	237	10,924	349	5,282	1,823	1,617	603	116
1992	212	4,566	6,605	659	82	2,981	649	2,113	812	55	1,125	42
1993	576	3,576	1,827	929	10	7,601	340	4,113	1,181	324	631	256
1994	600	5,013	6,106	777	18	5,825	150	2,812	663	196	230	373
1995	347	3,564	966	715	83	4,721	164	2,930	471	421	861	125
1996	406	6,905	5,627	1,238	100	6,112	185	4,815	840	260	485	405
1997	968	3,891	1,276	506	30	5,866	130	4,067	508	631	710	493
1998	545	3,693	4,951	815	16	4,117	252	3,268	270	100	293	259
1999	573	4,719	3,038	603	0	7,927	178	4,053	548	380	628	125
2000	675	6,487	2,439	1,062	32	8,641	134	3,348	768	1,329	664	521
2001	271	4,541	349	3,225	39	5,944	154	3,067	471	2,412	1,056	101
2002	814	4,057	4,070	1,346	0	4,602	305	5,774	535	495	476	244
2003	239	3,050	2,285	553	572	6,257	109	4,373	869	919	735	22
2004	418	5,302	7,549	707	404	5,711	212	3,675	1,583	2,513	652	79
2005	561	7,076	3,004	436	232	3,700	177	2,177	564	514	393	50
2006	427	11,643	5,305	1,592	22	5,613	44	1,483	107	654	607	63
2007	293	6,939	1,631	723	72	5,883	7	1,735	585	1,147	1,066	0
2008	594	11,927	7,567	2,954	209	4,523	0	2,181	566	307	61	130
2009	291	6,579	1,305	652	0	5,747	63	4,604	582	418	946	6
2010	61	5,876	2,712	865	0	2,551	129	1,206	595	398	595	18
2000–2009 Average	**458**	**6,760**	**3,550**	**1,325**	**158**	**5,662**	**121**	**3,242**	**663**	**1,071**	**666**	**122**
2005–2009 Average	**433**	**8,833**	**3,762**	**1,271**	**107**	**5,093**	**58**	**2,436**	**481**	**608**	**615**	**50**

Table 6.–Sport fish catch by species in the NW/NSMA, 1991–2010.

Year	King Salmon	Coho Salmon	Pink Salmon	Chum Salmon	Sockeye Salmon	Dolly Varden/ Arctic Char	Lake Trout	Arctic Grayling	Northern Pike	Whitefish	Sheefish	Burbot
1991	512	8,132	4,038	2,664	498	29,742	1,418	37,735	6,136	1,719	1,616	116
1992	640	8,351	24,436	3,301	106	16,172	1,634	17,348	5,408	230	2,618	58
1993	3,074	5,903	5,800	2,729	116	32,798	859	29,329	4,461	681	1,354	278
1994	912	7,049	13,108	2,741	105	20,553	584	20,871	3,273	360	481	633
1995	739	7,288	3,420	3,657	229	18,796	1,374	26,921	3,277	540	2,980	165
1996	2,166	11,735	15,466	8,670	314	21,657	924	29,039	4,662	938	3,152	429
1997	5,379	6,862	5,690	3,454	305	28,861	1,238	44,624	2,845	1,518	2,145	661
1998	1,647	9,288	23,906	5,043	209	21,627	1,403	27,057	1,556	1,350	803	285
1999	948	13,417	3,834	5,612	124	33,149	1,168	41,558	4,086	534	5,077	137
2000	1,779	13,350	11,670	6,966	149	29,596	587	32,703	2,541	2,179	2,628	565
2001	584	8,162	2,002	6,034	53	17,159	1,375	23,840	3,613	2,778	4,786	146
2002	2,032	7,406	13,048	6,708	53	15,833	960	43,826	2,335	951	1,960	244
2003	1,314	6,013	8,818	3,159	1,323	17,474	1,175	33,587	2,230	2,226	5,462	33
2004	2,006	16,698	42,795	3,777	680	17,511	1,139	23,395	4,074	3,409	1,750	144
2005	1,086	24,160	25,830	3,491	346	14,858	1,193	20,866	1,572	1,210	1,043	50
2006	2,592	20,282	24,749	6,950	334	19,721	1,197	14,785	2,316	884	5,051	63
2007	1,034	13,449	6,854	6,841	116	18,535	322	22,153	16,578	1,543	1,639	105
2008	823	28,338	39,416	10,513	446	25,512	21	23,145	3,508	1,346	482	188
2009	623	17,338	8,197	5,379	112	25,465	184	30,878	3,061	1,226	5,050	6
2010	99	14,245	8,244	3,743	0	12,845	258	23,318	3,228	1,621	2,928	43
2000–2009 Average	**1,387**	**15,520**	**18,338**	**5,982**	**361**	**20,166**	**815**	**26,918**	**4,183**	**1,775**	**2,985**	**154**
2005–2009 Average	**1,232**	**20,713**	**21,009**	**6,635**	**271**	**20,818**	**583**	**22,365**	**5,407**	**1,242**	**2,653**	**82**

Table 7.–King salmon sport harvest and catch in Seward Peninsula/Norton Sound rivers, 1991–2010.

Harvest

Year	Nome	Pilgrim	Unalakleet	Fish-Niukluk	Sinuk	Snake	Solomon	Other	Total
1991	22	51	296	14	0	7	7	7	404
1992	16	55	117	0	0	8	0	8	204
1993	93	28	382	9	9	9	28	37	595
1994	0	0	379	10	0	0	0	211	600
1995	0	19	259	18	0	0	0	142	438
1996	0	0	384	11	0	0	0	267	662
1997	10	45	842	71	0	0	0	138	1,106
1998	0	32	513	0	0	0	0	45	590
1999	0	0	415	44	0	0	0	171	630
2000	0	0	345	174	0	0	0	370	889
2001	0	0	250	0	0	0	0	84	334
2002	0	0	544	75	0	0	0	183	802
2003	0	103	97	39	0	0	0	0	239
2004	0	0	356	22	0	0	0	157	535
2005	0	0	216	37	0	0	0	308	561
2006	0	0	394	0	0	0	0	33	427
2007	0	0	147	0	0	0	0	130	277
2008	0	0	580	0	0	0	0	0	580
2009	13	0	248	30	0	0	0	0	291
2010	0	0	61	0	0	0	0	0	61
2000–2009 Average	**1**	**10**	**318**	**38**	**0**	**0**	**0**	**127**	**494**
2005–2009 Average	**3**	**0**	**317**	**13**	**0**	**0**	**0**	**94**	**427**

Catch

Year	Nome	Pilgrim	Unalakleet	Fish-Niukluk	Sinuk	Snake	Solomon	Other	Total
1991	22	65	375	22	0	14	7	7	512
1992	23	55	476	0	0	8	0	8	570
1993	121	92	2,340	9	9	9	47	440	3,067
1994	0	0	517	29	0	60	0	271	877
1995	0	19	588	18	0	0	0	224	849
1996	21	0	2,059	64	0	0	0	277	2,421
1997	20	90	5,144	125	0	0	0	138	5,517
1998	19	32	1,539	15	0	0	17	98	1,720
1999	0	20	669	55	0	0	0	279	1,023
2000	0	0	1,045	207	0	0	57	711	2,020
2001	0	0	542	21	0	0	0	105	668
2002	24	0	835	111	0	0	0	1026	1,996
2003	0	268	505	515	0	0	0	13	1,301
2004	0	0	1,930	22	0	0	0	401	2,353
2005	0	0	431	74	0	0	0	569	1,074
2006	0	0	2,511	0	0	0	0	65	2,576
2007	0	0	776	0	0	0	0	162	938
2008	0	0	796	0	0	0	0	0	796
2009	13	0	515	95	0	0	0	0	623
2010	0	0	99	0	0	0	0	0	99
2000–2009 Average	**4**	**27**	**989**	**105**	**0**	**0**	**6**	**305**	**1,435**
2005–2009 Average	**3**	**0**	**1,006**	**34**	**0**	**0**	**0**	**159**	**1,201**

Table 8.–Coho salmon sport harvest and catch in Seward Peninsula/Norton Sound rivers, 1991–2010.

Harvest

Year	Nome	Pilgrim	Unalakleet	Fish-Niukluk	Sinuk	Snake	Solomon	Other	Total
1991	417	310	2,180	977	71	798	83	964	5,800
1992	713	57	1,555	753	40	510	316	727	4,671
1993	602	191	643	1,185	96	248	420	398	3,783
1994	326	134	2,425	1,122	109	145	235	1,051	5,547
1995	143	113	2,033	818	19	85	38	456	3,705
1996	598	133	3,411	1,652	189	426	142	738	7,289
1997	295	0	2,784	462	0	98	10	744	4,393
1998	189	6	2,742	316	0	0	0	1,188	4,441
1999	219	33	2,691	1,365	0	209	22	1,043	5,582
2000	342	179	4,150	1,165	11	209	32	1,353	7,441
2001	297	29	2,766	969	62	175	39	465	4,802
2002	217	0	2,937	298	0	35	0	724	4,211
2003	68	113	1,604	216	0	11	0	1,027	3,039
2004	270	45	3,524	291	13	163	90	1,410	5,806
2005	1,001	48	3,959	400	230	182	0	2,079	7,899
2006	2,768	150	4,985	948	191	414	156	2,671	12,283
2007	797	118	4,117	786	54	142	337	546	6,897
2008	1,793	57	6,029	1,986	322	563	63	1,134	11,947
2009	229	15	5,027	928	74	55	130	121	6,579
2010	602	40	3,006	1,069	210	131	122	696	5,876
2000–2009 Average	**778**	**75**	**3,910**	**799**	**96**	**195**	**85**	**1,153**	**7,090**
2005–2009 Average	**1,318**	**78**	**4,823**	**1,010**	**174**	**271**	**137**	**1,310**	**9,121**

Catch

Year	Nome	Pilgrim	Unalakleet	Fish-Niukluk	Sinuk	Snake	Solomon	Other	Total
1991	869	476	2,882	1,417	167	1,798	83	1,118	8,810
1992	1,466	162	2,802	1,555	65	640	316	1,409	8,415
1993	764	325	1,572	1,804	143	306	650	583	6,147
1994	386	436	2,488	1,448	172	235	255	2,317	7,737
1995	228	472	3,086	1,401	113	245	208	1,733	7,486
1996	788	265	5,863	3,348	246	530	237	1,196	12,473
1997	447	49	4,020	1,751	196	118	39	867	7,487
1998	863	65	3,213	772	0	64	59	5,123	10,159
1999	231	77	9,593	2,151	0	606	185	1,540	14,383
2000	385	200	9,287	2,952	21	209	53	1,273	14,380
2001	377	29	5,399	1,739	96	214	39	629	8,522
2002	549	5	3,691	1,549	53	156	35	1,522	7,560
2003	90	203	2,832	1,447	0	11	0	1,603	6,186
2004	428	124	12,655	1,653	13	307	90	2,376	17,646
2005	1,523	48	14,396	1,586	742	325	0	7,563	26,183
2006	4,607	185	9,397	1,320	1,428	597	156	3,232	20,922
2007	919	201	8,967	1,014	184	184	381	1,547	13,397
2008	2,507	222	11,511	7,752	749	941	94	4,488	28,264
2009	270	15	14,425	2,095	131	55	193	136	17,320
2010	680	106	8,968	1,273	558	131	159	2,370	14,245
2000–2009 Average	**1,166**	**123**	**9,256**	**2,311**	**342**	**300**	**104**	**2,437**	**16,038**
2005–2009 Average	**1,965**	**134**	**11,739**	**2,753**	**647**	**420**	**165**	**3,393**	**21,217**

Table 9.–Pink salmon sport harvest and catch in Seward Peninsula/Norton Sound rivers, 1991–2010.

Harvest

Year	Nome	Pilgrim	Unalakleet	Fish-Niukluk	Sinuk	Snake	Solomon	Other	Total
1991	356	81	437	356	51	71	173	213	1,738
1992	4,397	55	779	357	293	183	210	129	6,403
1993	723	0	89	278	115	151	259	635	2,250
1994	4,103	154	402	231	145	452	256	1,308	7,051
1995	230	0	222	136	28	19	87	206	928
1996	3,280	49	59	404	285	659	0	1,236	5,972
1997	83	0	1,055	58	54	0	15	193	1,458
1998	1,985	0	434	0	0	463	154	3,903	6,939
1999	0	0	2,946	80	0	0	0	13	3,039
2000	578	6	961	51	10	103	113	1,064	2,886
2001	0	0	188	161	0	0	0	11	360
2002	312	0	1,378	254	0	0	0	2,359	4,303
2003	12	437	29	196	0	0	97	1,451	2,222
2004	3,369	0	2,003	353	156	60	0	2,368	8,309
2005	1,193	23	473	58	62	12	23	1,183	3,027
2006	2,422	67	891	134	330	430	100	943	5,317
2007	402	0	618	30	0	0	281	270	1,601
2008	2,954	0	2077	969	175	539	141	1,404	8,259
2009	178	0	579	23	12	35	12	466	1,305
2010	1716	0	535	99	49	121	63	134	2,717
2000–2009 Average	**1,142**	**53**	**920**	**223**	**75**	**118**	**77**	**1,152**	**3,759**
2005–2009 Average	**1,430**	**18**	**928**	**243**	**116**	**203**	**111**	**853**	**3,902**

Catch

Year	Nome	Pilgrim	Unalakleet	Fish-Niukluk	Sinuk	Snake	Solomon	Other	Total
1991	894	406	559	579	224	234	620	477	3,993
1992	9,810	714	6,503	1,969	1,429	1,182	998	3,250	25,855
1993	1,756	392	605	909	547	429	633	1,126	6,397
1994	6,190	350	1,020	2,052	348	648	784	2,867	14,259
1995	980	58	799	300	125	300	190	521	3,273
1996	5,898	364	2,594	3,512	736	967	39	1,928	16,038
1997	190	0	4,101	1,209	76	0	74	304	5,954
1998	3,482	263	4,853	3,252	0	463	433	13,023	25,769
1999	13	0	3,475	187	0	0	13	147	3,835
2000	876	109	3,982	3,989	21	103	288	2,618	11,986
2001	32	0	1,197	279	11	21	407	748	2,695
2002	3,090	0	2,463	772	0	0	192	6,881	13,398
2003	73	1,044	3,762	626	68	0	97	3,294	8,964
2004	6,189	163	10,332	10,176	1,352	223	195	15,430	44,060
2005	2,095	38	8,778	1,283	279	70	47	13,324	25,914
2006	6,242	134	4,791	700	2,327	1790	267	8,294	24,545
2007	745	0	4,256	178	121	234	311	909	6,754
2008	8,785	49	15,470	3,491	1,202	810	236	8,587	38,630
2009	238	0	5,593	351	133	35	47	1,404	7,801
2010	2,206	0	3,074	674	581	264	329	1,066	8,194
2000–2009 Average	**2,837**	**154**	**6,062**	**2,185**	**551**	**329**	**209**	**6,149**	**18,475**
2005–2009 Average	**3,621**	**44**	**7,778**	**1,201**	**812**	**588**	**182**	**6,504**	**20,729**

Table 10.–Chum salmon sport harvest and catch in Seward Peninsula/Norton Sound rivers, 1991–2010.

Harvest

Year	Nome	Pilgrim	Unalakleet	Fish-Niukluk	Sinuk	Snake	Solomon	Other	Total
1991	241	85	497	272	47	93	0	180	1,415
1992	0	106	379	15	0	0	0	23	523
1993	0	0	116	514	0	0	0	61	691
1994	0	0	220	119	0	7	0	190	536
1995	0	73	207	27	0	0	0	87	394
1996	0	0	463	166	0	0	0	33	662
1997	0	0	228	0	0	0	0	50	278
1998	0	0	447	0	0	0	0	235	682
1999	0	0	211	0	0	0	0	0	211
2000	0	0	403	0	0	0	0	694	1,097
2001	0	0	714	439	0	0	0	556	1,709
2002	0	0	607	45	0	0	0	166	818
2003	0	0	191	101	0	0	0	0	292
2004	0	0	47	435	0	0	0	16	498
2005	0	0	36	0	0	0	0	294	330
2006	0	0	224	0	0	0	0	120	344
2007	0	0	85	11	0	0	0	9	105
2008	0	0	175	166	0	0	0	414	755
2009	0	0	258	71	0	0	0	83	412
2010	0	0	59	0	0	0	0	59	118
2000–2009 Average	**0**	**0**	**274**	**127**	**0**	**0**	**0**	**235**	**636**
2005–2009 Average	**0**	**0**	**156**	**50**	**0**	**0**	**0**	**184**	**389**

Catch

Year	Nome	Pilgrim	Unalakleet	Fish-Niukluk	Sinuk	Snake	Solomon	Other	Total
1991	389	194	692	521	186	109	47	242	2,380
1992	266	197	1,412	326	15	0	91	129	2,436
1993	175	254	515	945	28	37	0	265	2,219
1994	36	146	561	1,271	22	37	7	482	2,562
1995	478	232	966	428	44	189	22	525	2,884
1996	432	133	1,589	1,660	200	111	0	550	4,675
1997	113	15	1,323	714	160	9	0	495	2,829
1998	8	44	2,218	822	0	0	0	1,746	4,838
1999	0	0	1,916	265	0	0	0	234	2,415
2000	20	24	3,652	952	12	0	278	781	5,719
2001	13	11	2,030	543	0	78	0	5,857	8,532
2002	220	0	1,653	747	23	0	81	2,132	4,856
2003	0	548	1,681	258	14	0	0	303	2,804
2004	14	33	1,473	979	149	14	0	1,168	3,830
2005	0	64	1,822	177	477	54	0	675	3,269
2006	122	0	1,628	0	709	116	11	300	2,886
2007	121	128	554	190	91	15	105	1,842	3,046
2008	157	0	4,055	277	120	92	204	1,056	5,961
2009	0	0	1,885	71	8	0	0	149	2,113
2010	53	0	2,127	501	52	0	0	124	2,857
2000–2009 Average	**67**	**81**	**2,043**	**419**	**160**	**37**	**68**	**1,426**	**4,302**
2005–2009 Average	**80**	**38**	**1,989**	**143**	**281**	**55**	**64**	**804**	**3,455**

Table 11.–Dolly Varden and Arctic char sport harvest in the NW/NSMA by subarea and river, 1991–2010.

	Seward Peninsula/Norton Sound Harvest										Kotzebue/Chukchi Sea Harvest						
Year	Salt Water	Nome River	Pilgrim River	Unalakleet River	Fish-Niukluk River	Sinuk River	Snake River	Solomon River	Other Streams/ Lakes	Total	Salt Water	Kobuk River	Noatak River	Wulik River	Other Streams/ Lakes	Total	Grand Total
1991	0	1,220	856	1,474	1,474	729	1,252	2,219	1,141	10,365	199	170	936	298	114	1,717	12,082
1992	204	557	131	746	270	139	115	131	89	2,382	0	99	197	140	246	682	3,064
1993	205	917	448	427	1,003	536	331	893	1,147	5,907	0	9	325	263	317	914	6,821
1994	90	431	63	410	699	305	117	197	759	3,071	27	132	786	858	562	2,365	5,436
1995	0	462	74	976	346	158	131	366	395	2,908	22	28	124	389	287	850	3,758
1996	12	873	388	1,506	402	485	97	49	473	4,285	0	172	632	85	109	998	5,283
1997	189	328	65	936	2,071	346	81	186	265	4,467	22	11	103	252	344	732	5,199
1998	0	302	14	588	160	311	0	383	482	2,240	0	49	175	200	216	640	2,880
1999	330	791	45	2,384	1,952	88	44	154	920	6,708	0	49	255	312	492	1,108	7,816
2000	1,069	340	0	4,462	1,687	59	199	0	136	7,952	281	47	763	348	508	1,947	9,899
2001	166	43	270	1,002	1,197	86	108	162	140	3,174	108	79	1,026	430	480	2,123	5,297
2002	67	511	72	789	259	47	18	18	471	2,252	18	197	1,495	138	174	2,022	4,274
2003	0	1,223	482	134	110	712	13	0	2,857	5,531	0	29	354	137	150	670	6,201
2004	72	226	0	3,593	120	42	0	53	212	4,318	0	642	69	148	574	1,433	5,751
2005	95	553	12	500	1,148	141	27	0	141	2,617	0	0	63	176	176	415	3,032
2006	0	959	0	1,307	0	531	51	153	179	3,180	116	71	1,075	989	1,066	3,317	6,497
2007	14	625	0	731	193	144	461	481	159	2,808	20	29	2,379	372	496	3,296	6,104
2008	0	46	0	1,062	1,061	107	46	0	997	3,319	0	0	640	117	212	969	4,288
2009	0	253	0	2,794	108	50	50	0	118	3,373	17	197	853	272	305	1,644	5,017
2010	0	165	0	1,411	12	117	0	24	106	1,835	348	12	59	59	15	493	2,328
2000–2009 Average	**148**	**478**	**84**	**1,637**	**588**	**192**	**97**	**87**	**541**	**3,852**	**56**	**129**	**872**	**313**	**414**	**1,784**	**5,636**
2005–2009 Average	**22**	**487**	**2**	**1,279**	**502**	**195**	**127**	**127**	**319**	**3,059**	**31**	**59**	**1,002**	**385**	**451**	**1,928**	**4,988**

Table 12.–Dolly Varden and Arctic char sport catch in the NW/NSMA by subarea and river, 1991–2010.

	Seward Peninsula/Norton Sound Catch										Kotzebue/Chukchi Sea Catch						
Year	Salt Water	Nome River	Pilgrim River	Unalakleet River	Fish-Niukluk River	Sinuk River	Snake River	Solomon River	Other Streams/ Lakes	Total	Salt Water	Kobuk River	Noatak River	Wulik River	Other Streams/ Lakes	Total	Grand Total
1991	0	3,725	2,679	2,267	3,344	2,584	3,471	4,549	2,806	25,425	199	297	1,247	581	284	2,608	28,033
1992	286	1,114	279	1,942	877	770	180	197	367	6,012	0	664	3,826	917	1,647	7,054	13,066
1993	205	5,153	2,736	964	5,838	1,179	1,003	1,725	3,246	22,166	106	858	3,526	1,784	916	7,190	29,356
1994	90	631	152	1,253	2,116	830	420	448	1,394	7,334	27	379	4,618	3,413	2,296	10,733	18,067
1995	115	1,474	218	2,732	640	723	507	734	778	7,921	22	1,962	1,427	2,106	2,287	7,804	15,725
1996	12	1,311	509	3,073	1,872	618	255	49	1,104	8,803	12	661	1,203	1,953	1,547	5,376	14,179
1997	189	873	254	4,400	9,952	1,249	243	415	1,773	19,348	108	311	1,849	3,599	1,479	7,346	26,694
1998	0	319	41	2,336	1,180	311	0	410	1,426	6,023	16	259	2,861	5,132	338	8,606	14,629
1999	486	1,486	585	10,460	5,601	198	257	573	2,773	22,419	0	262	2,856	3,061	2,080	8,259	30,678
2000	1,195	429	0	10,222	2,250	95	199	1,511	2,384	18,285	281	2,094	1,721	2,345	1,524	7,965	26,250
2001	166	94	439	2,769	3,053	108	108	399	1,411	8,547	108	79	1,595	2,934	0	4,766	13,313
2002	67	543	75	2,593	800	74	18	18	3,820	8,008	18	1,415	1,619	2,139	1,342	6,552	14,560
2003	12	1,276	549	4,284	1,561	840	27	0	5,872	14,421	0	347	728	3,118	99	4,292	18,713
2004	269	374	80	10,928	849	42	0	67	1,587	14,196	0	1,701	503	844	729	3,777	17,973
2005	95	992	59	3,299	2,688	294	423	0	2,231	10,081	0	0	429	2,260	726	3,415	13,496
2006	0	1,947	64	2,986	67	2,767	115	230	2,188	10,364	154	563	2,686	4,001	586	7,990	18,354
2007	14	754	0	4,763	1,852	1,695	481	560	1,222	11,341	50	159	4,601	800	124	5,734	17,075
2008	15	107	0	7,154	1,926	595	61	12	3,723	13,593	0	17	2,748	3,143	733	6,641	20,234
2009	0	629	0	12,746	348	394	16	282	1,931	16,346	17	255	3,380	2,507	65	6,224	22,570
2010	0	224	29	6,987	307	161	0	24	428	8,160	447	144	629	396	59	1,675	9,835
2000–2009 Average	**183**	**715**	**127**	**6,174**	**1,539**	**690**	**145**	**308**	**2,637**	**12,518**	**63**	**663**	**2,001**	**2,409**	**593**	**5,736**	**18,254**
2005–2009 Average	**25**	**886**	**25**	**6.190**	**1,376**	**1,149**	**219**	**217**	**2,259**	**12,345**	**44**	**199**	**2,769**	**2,542**	**447**	**6,001**	**18,346**

Table 13.–Aerial counts of Dolly Varden spawning in the Noatak River and overwintering in the Wulik and Kivalina rivers, 1991–2010.

	Spawners	Nonspawners	
Year	Noatak River	Wulik River	Kivalina River
1991	9,605	126,985	35,275
1992	ND	135,135	ND
1993	9,560	144,138	16,534
1994	ND	66,752	ND
1995	6,500	128,705	28,870
1996	12,184	61,005	ND
1997	ND	95,412	ND
1998	ND	104,043	ND
1999	9,636	70,704	ND
2000	ND	ND	ND
2001	ND	92,614	ND
2002	3,655	44,257	ND
2003	ND	ND	ND
2004	ND	101,806	ND
2005	ND	120,848	ND
2006	ND	108,352	ND
2007	ND	99,311	ND
2008	ND	71,463	ND
2009	ND	63,997	ND
2010	ND	36,866	ND

Table 14.–Arctic grayling sport harvest and catch in Seward Peninsula/Norton Sound rivers, 1991–2010.

Harvest

Year	Nome	Pilgrim	Unalakleet	Fish-Niukluk	Sinuk	Snake	Solomon	Other	Total
1991	186	445	1,708	1,320	129	402	158	773	5,121
1992	0	91	98	128	0	16	0	159	492
1993	0	75	131	585	37	467	0	289	1,584
1994	16	49	353	506	8	32	0	236	1,200
1995	0	52	291	404	18	18	0	254	1,037
1996	0	73	420	313	97	121	0	461	1,485
1997	0	81	210	734	0	0	0	236	1,261
1998	0	0	144	16	8	8	0	122	298
1999	0	11	277	1,029	11	113	0	159	1,600
2000	0	58	538	442	0	16	0	149	1,203
2001	0	43	247	430	43	63	0	168	994
2002	0	31	773	452	103	110	0	96	1,565
2003	0	98	131	387	12	140	0	1,010	1,778
2004	0	0	579	102	0	91	0	52	824
2005	0	0	32	402	16	33	0	112	595
2006	0	83	60	0	138	0	0	138	419
2007	0	26	10	12	77	141	0	48	314
2008	0	0	346	322	0	34	0	263	965
2009	0	0	457	456	34	0	0	256	1,169
2010	0	0	148	0	68	0	0	16	232
2000–2009 Average	**0**	**34**	**317**	**301**	**42**	**63**	**0**	**229**	**983**
2005–2009 Average	**0**	**22**	**181**	**238**	**53**	**42**	**0**	**163**	**692**

Catch

Year	Nome	Pilgrim	Unalakleet	Fish-Niukluk	Sinuk	Snake	Solomon	Other	Total
1991	1,363	4,463	4,104	7,261	1,291	2,096	602	1,980	23,160
1992	90	526	1,459	2,171	300	158	38	1,030	5,772
1993	569	2,362	874	5,976	879	1,614	140	809	13,223
1994	1,111	266	1,639	2,389	417	377	212	670	7,081
1995	571	370	1,471	1,169	498	887	200	622	5,788
1996	497	821	1,694	4,653	339	1,055	97	1,250	10,406
1997	569	429	4,918	10,452	1,464	123	703	1,529	20,187
1998	207	65	3,256	8,159	25	218	0	1,570	13,500
1999	300	694	6,089	7,414	22	723	21	869	16,132
2000	10	221	6,814	1,701	29	449	853	992	11,069
2001	60	403	2,331	3,972	218	1,385	0	1,098	9,467
2002	735	144	4,229	6,587	432	279	0	351	12,757
2003	94	397	6,189	5,495	249	559	80	1,954	15,017
2004	113	0	3,478	1,594	0	238	130	533	6,086
2005	92	48	1,137	3,316	171	338	161	112	5,,375
2006	560	220	669	311	1,331	262	83	794	4,230
2007	61	26	2,375	3,287	902	260	0	937	7,848
2008	183	13	3,497	4,073	84	234	0	1,659	9,743
2009	214	0	4,497	6,458	352	364	13	1,724	13,257
2010	28	93	3,304	3,659	348	55	0	146	7,633
2000–2009 Average	**212**	**147**	**3,522**	**3,679**	**377**	**437**	**132**	**1,015**	**9,942**
2005–2009 Average	**222**	**61**	**2,435**	**3,489**	**568**	**292**	**51**	**1,045**	**8,770**

Table 15.–Arctic grayling sport harvest and catch in the Kotzebue Sound/Chukchi Sea subarea, 1991–2010.

Harvest

Year	Kobuk River	Noatak River	Other Streams	Lakes	Total
1991	446	817	631	87	1,981
1992	255	105	87	360	968
1993	305	322	234	55	916
1994	178	407	186	33	804
1995	383	185	263	79	910
1996	513	1,136	393	94	2,136
1997	476	872	555	0	1,903
1998	1,729	42	0	17	1,788
1999	672	412	97	66	1,247
2000	836	223	45	129	1,233
2001	355	620	111	158	1,244
2002	1,674	79	233	8	1,994
2003	781	528	129	35	1,473
2004	1,157	317	509	0	1,983
2005	231	38	0	6	275
2006	172	301	270	17	760
2007	307	433	32	64	836
2008	47	232	14	0	293
2009	143	208	35	53	439
2010	214	52	100	0	366
2000–2009 Average	**570**	**298**	**138**	**47**	**1,053**
2005–2009 Average	**180**	**242**	**70**	**28**	**521**

Catch

Year	Kobuk River	Noatak River	Other Streams	Lakes	Total
1991	1,535	2,402	1,264	174	5,375
1992	1,593	1,112	738	1,548	4,991
1993	1,717	1,718	3,151	642	7,228
1994	1,593	842	2,653	374	5,462
1995	5,146	1,114	7,921	1,560	15,741
1996	2,469	3,886	3,516	1,306	11,177
1997	2,815	2,179	3,182	216	8,392
1998	5,280	964	548	404	7,196
1999	6,680	3,621	5,114	66	15,481
2000	5,753	1,668	1,934	376	9,731
2001	4,103	2,123	975	171	7,372
2002	18,080	452	2,703	460	21,695
2003	5,860	3,875	658	233	10,626
2004	8,369	652	1,274	0	10,295
2005	1,639	435	826	0	2,900
2006	2,328	1,827	2,735	17	6,907
2007	2,191	1,965	32	1,975	6,163
2008	301	1,722	1,805	112	3,940
2009	4,065	2,542	509	53	7,169
2010	1,540	1,559	1,102	0	4,201
2000–2009 Average	**5,269**	**1,726**	**1,345**	**340**	**8,680**
2005–2009 Average	**2,105**	**1,698**	**1,181**	**431**	**5,416**

Table 16.–Reported subsistence sheefish harvest, Kotzebue District, 1970–2010.

Year	Number of Fishers Interviewed	Reported Harvest	Average Catch Per Household	Hotham Inlet Winter Harvest
1970	168	13,928	83	ND
1971	155	13,583	88	ND
1972	79	3,832	49	ND
1973	65	4,883	75	ND
1974	58	1,062	18	ND
1975	69	1,637	24	ND
1976	57	966	17	ND
1977	95	1,810	19	ND
1978	95	1,810	19	ND
1979	75	3,985	53	ND
1980	74	3,117	42	ND
1981	62	6,651	107	ND
5/82–4/83[a]	430	4,704	36	ND
5/83–4/84[a]	27	764	28	ND
5/84–9/84[a]	30	2,803	93	ND
1985[b]	2	60	30	ND
1986[a, b]	72	721	10	ND
1987[b]	46	276	6	ND
1988[b, c]	ND	ND	ND	ND
1989[c]	ND	ND	ND	ND
1990[c]	ND	ND	ND	ND
1991	40	2,180	55	ND
1992	43	2,821	66	ND
1993[c]	ND	ND	ND	ND
1994	171	3,181[d]	84	ND
1995	314	9,465[d]	25	15,161[e]
1996	389	6,953[d]	18	13,704[e]
1997	338	9,805[d]	25	ND
1998	435	5,350[d]	14	ND
1999	191	8,256[d]	19	ND
2000	237	7,446[d]	17	14,533[e]
2001	257	3,838[d]	11	ND
2002	115	4,310[d]	38	ND
2003	488	7,813	16	ND
2004	440	10,163	23	ND
2005	ND	ND	ND	ND
2006	77[f]	1,298	14	ND
2007	90[g]	99	1	ND
2008	ND	ND	ND	ND
2009	ND	ND	ND	ND
2010	ND	ND	ND	ND

Note: Due to limited survey effort during many years, total catch and effort are minimums and are not comparable among years. Data from Brennan et al. 1999.

[a] Summer harvest only.

[b] Data from fall subsistence salmon surveys may include summer and winter harvests.

[c] Subsistence sheefish harvest not documented.

[d] Reported harvest from Kobuk River villages only.

[e] Taube 1997, Taube and Wuttig 1998, Savereide 2002.

[f] Reported harvest from Kiana Village only. Data from Magdanz et al. 2011.

[g] Reported harvest from Noatak Village only. Data from Magdanz et al. 2011.

Table 17.–Sport fish harvest and catch of sheefish from northwest Alaska waters, 1991–2010.

	Total Harvest		%	Kobuk River		%	Selawik River		%
Year	Harvest	Catch	Harvested	Harvest	Catch	Harvested	Harvest	Catch	Harvested
1991	603	1,616	37	579	1,568	37	24	48	50
1992	1,904	3,678	52	627	2,034	31	411	411	100
1993	1,029	2,273	45	395	1,074	37	111	111	100
1994	564	958	59	135	386	35	95	95	100
1995	1,142	3,270	35	748	2,669	28	38	47	81
1996	485	3,183	15	360	2,850	13	94	271	35
1997	906	2,341	39	318	1,334	24	108	108	100
1998	414	924	45	145	617	24	148	186	80
1999	635	5,134	12	621	5,070	12	nd	nd	Nd
2000	1,201	3,372	36	362	2,338	16	0	0	0
2001	1,305	5,146	25	552	4,105	13	0	0	0.0
2002	500	1,996	25	352	1,710	21	119	239	50
2003	2,509	7,324	34	676	4,517	15	59	59	100
2004	1,634	2,837	58	477	1,575	30	58	58	100
2005	393	1,043	38	393	1,043	37	0	0	0
2006	810	5,254	15	566	4,929	12	0	0	0
2007	1,066	1,639	65	742	1,283	58	0	0	0
2008	61	482	13	0	209	0	0	0	0
2009	946	5,050	19	747	4,474	17	0	0	0
2010	595	2,928	20	86	1,910	5	221	368	60
2000–2009 Average	**1,043**	**3,414**	**33**	**487**	**2,618**	**22**	**24**	**36**	**25**
2005–2009 Average	**655**	**2,694**	**30**	**490**	**2,388**	**25**	**0**	**0**	**0**

Table 18.–Sport fishing effort, catch and harvest of lake trout, Dolly Varden/Arctic char and Arctic grayling in the North Slope subarea, 1991–2010.

Year	Angler-days		Lake trout		Dolly Varden/Arctic char		Arctic grayling	
	Total	Haul Road	Total	Haul Road	Total	Haul Road	Total	Haul Road
				Harvest				
1991	7,291	3,535	176	ND	1,199	640	3,301	1,921
1992	4,940	2,211	379	293	836	336	1,145	324
1993	5,600	3,421	106	57	1,092	623	1,632	547
1994	5,407	2,926	73	73	589	451	807	371
1995	5,644	3,275	38	38	896	437	983	579
1996	4,487	2,700	19	ND	1,108	547	1,194	619
1997	5,278	3,224	57	34	1,018	413	903	426
1998	3,653	2,121	221	129	1,454	1,071	1,182	604
1999	5,230	2,473	77	ND	929	341	1,206	365
2000	4,739	2,325	18	18	1,178	267	934	370
2001	6,032	4,256	37	ND	1,589	1,006	846	510
2002	6,032	2,224	217	ND	773	266	2,215	590
2003	2,710	1,103	98	ND	193	ND	1,122	263
2004	3,311	873	75	ND	180	105	868	103
2005	4,352	1,881	96	ND	493	99	1,313	810
2006	3,104	1,298	10	ND	304	170	235	131
2007	4,154	1,873	0	ND	151	130	572	293
2008	5,599	3,774	0	ND	352	179	810	754
2009	3,905	1,813	0	ND	919	98	2,996	454
2010	4,384	3,746	117	ND	223	167	608	474
2000–2009 Average	**4,394**	**2,142**	**55**	**18**	**613**	**258**	**1,191**	**428**
2005–2009 Average	**4,223**	**2,128**	**21**	**ND**	**444**	**135**	**1,185**	**488**

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Table 18.–Page 2 of 2.

Year	Angler-days		Lake trout		Dolly Varden/Arctic char		Arctic grayling	
	Total	Haul Road	Total	Haul Road	Total	Haul Road	Total	Haul Road
				Catch				
1991	7,291	3,535	932	161	2,670	1,635	9,200	4,668
1992	4,940	2,211	887	556	3,850	1,769	6,608	2,135
1993	5,600	3,421	266	180	3,946	2,454	9,345	5,505
1994	5,407	2,926	327	316	3,178	2,371	8,552	5,165
1995	5,644	3,275	370	319	3,229	1,780	5,427	3,828
1996	4,487	2,700	298	159	8,06	6,933	7,456	4,708
1997	5,278	3,224	783	67	4,094	1,433	16,248	12,524
1998	3,653	2,121	1,292	269	7,716	4,166	7,529	4,862
1999	5,230	2,473	913	55	4,520	497	9,956	4,875
2000	4,739	2,325	457	457	7,579	2,561	12,523	8,244
2001	6,032	4,256	266	87	6,027	3,244	7,035	5,413
2002	6,032	2,224	410	54	2,195	433	9,374	4,767
2003	2,710	1,103	1,164	103	936	398	7,944	3,326
2004	3,311	873	540	163	803	345	7,014	2,525
2005	4,352	1,881	433	288	1,756	621	12,270	7,769
2006	3,104	1,298	850	401	1,930	53	3,648	759
2007	2,975	1,789	183	183	1,941	1631	8,142	6,463
2008	5,599	3,774	21	21	4,426	1,210	9,293	6,160
2009	3,905	1,813	67	67	3,165	1,187	10,452	5,810
2010	4,834	3,746	246	129	3,010	2,718	11,484	10,736
2000–2009 Average	**4,276**	**2,134**	**439**	**182**	**3,076**	**1,251**	**8,770**	**5,279**
2005–2009 Average	**3,987**	**2,111**	**311**	**192**	**2,644**	**1,106**	**8,761**	**5,703**

Table 19.–Aerial survey indices of Dolly Varden from the Ivishak, Anaktuvuk, and Kongakut rivers of the North Slope subarea, 1971–2010.

Year	Date	Ivishak River	Anaktuvuk River	Kongakut River	Survey Method	Survey Rating	Data Source
1971	22-Sept	24,470	ND	ND	H	Good	Yoshihara 1973
1972	24-Sept	11,937	ND	ND	H	Good	Yoshihara 1972
1973	11-Sept	8,992	ND	ND	H	Excellent	Furniss 1975
1974	10-Sept	11,000	ND	ND	H	Not Rated	Furniss 1975
1975	22-Sept	8,306	ND	ND	H	Not Rated	Bendock 1982
1976	22-Sept	8,570	ND	ND	H	Fair	Bendock 1982
1977	NS	ND	ND	ND	ND	ND	ND
1978	NS	ND	ND	ND	ND	ND	ND
1979	22-Sept	24,403	15,717	ND	S	Excellent	Bendock 1980
1980	NS	ND	ND	ND	ND	ND	ND
1981	22-Sept	24,873	10,536	ND	S	Excellent	Bendock 1982
1982	22-Sept	36,432	6,222	ND	S	Excellent	Bendock 1983
1983	22-Sept	27,820	8,743	ND	S	Excellent	Bendock and Burr 1984
1984	22-Sept	24,818	5,462	ND	S	Excellent	Bendock and Burr 1985
1985	NS	ND	ND	ND	ND	ND	ND
1986	ND	ND	ND	8,900	H	Unknown	Millard USFWS files*
1987	NS	ND	ND	ND	ND	ND	ND
1988	NS	ND	ND	ND	ND	ND	ND
1989	22-Sept	12,650	ND	6,355	H	Good	DeCicco ADF&G files*
1990	NS	ND	ND	ND	ND	ND	ND
1991	NS	ND	ND	ND	ND	ND	ND
1992	NS	ND	ND	ND	ND	ND	ND
1993	3-Sept	3,057	ND	ND	H	Good	Millard USFWS files*
1994	NS	ND	ND	ND	ND	ND	ND
1995	27-Sept	27,036	ND	14,080	H	Good	Burr ADF&G files*

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Table 19–Page 2 of 2.

Year	Date	Ivishak River	Anaktuvuk River	Kongakut River	Survey Method	Survey Rating	Data Source
2000	22-Sept	4,530[a]	ND	ND	H	Excellent	Viavant 2001
2001	22-Sept	10,932 [b]	ND	ND	H	Excellent	Viavant 2002
2002	22-Sept	5,408 [b]	4,800	ND	H	Excellent	Viavant 2003
2003	22-Sept	2,720 [b]	ND	ND	H	Good	Viavant 2005
2004	ND	ND	ND	ND	ND	ND	ND
2005	ND	ND	ND	ND	ND	ND	ND
2006	22-Sept	5,411 [b]	5,477	ND	H	Good	Viavant ADF&G files [c]
2007 [d]	19-Sept	6,520	5,807	ND	H	Good	Viavant ADF&G files [c]
2008 [e]		11,914	9,660	ND	H	Excellent	Viavant ADF&G files [c]
2009	ND	ND	ND	ND	ND	ND	ND
2010	ND	ND	ND	ND	ND	ND	ND

NS = no survey, H = helicopter, S = fixed wing aircraft (Super Club; PA-18).

[a] 6 km reach based on multiple aerial surveys.

[b] Complete 28 km index area, based on multiple aerial surveys Sept 18–22.

[c] M. Millard, Fishery Biologist, USFWS, Fairbanks; personal communication; F. DeCicco, SF Biologist, ADF&G, Fairbanks; personal communication; J. Burr, SF Biologist, ADF&G, Fairbanks; personal communication; T. Viavant, SF Biologist, ADF&G, Fairbanks; personal communication.

[d] 3,936 fish were counted on the Canning River and 9,575 fish were counted on the Hulahula River in 2007.

[e] 7,533 fish were counted on the Canning River and 3,652 fish were counted on the Hulahula River in 2008.

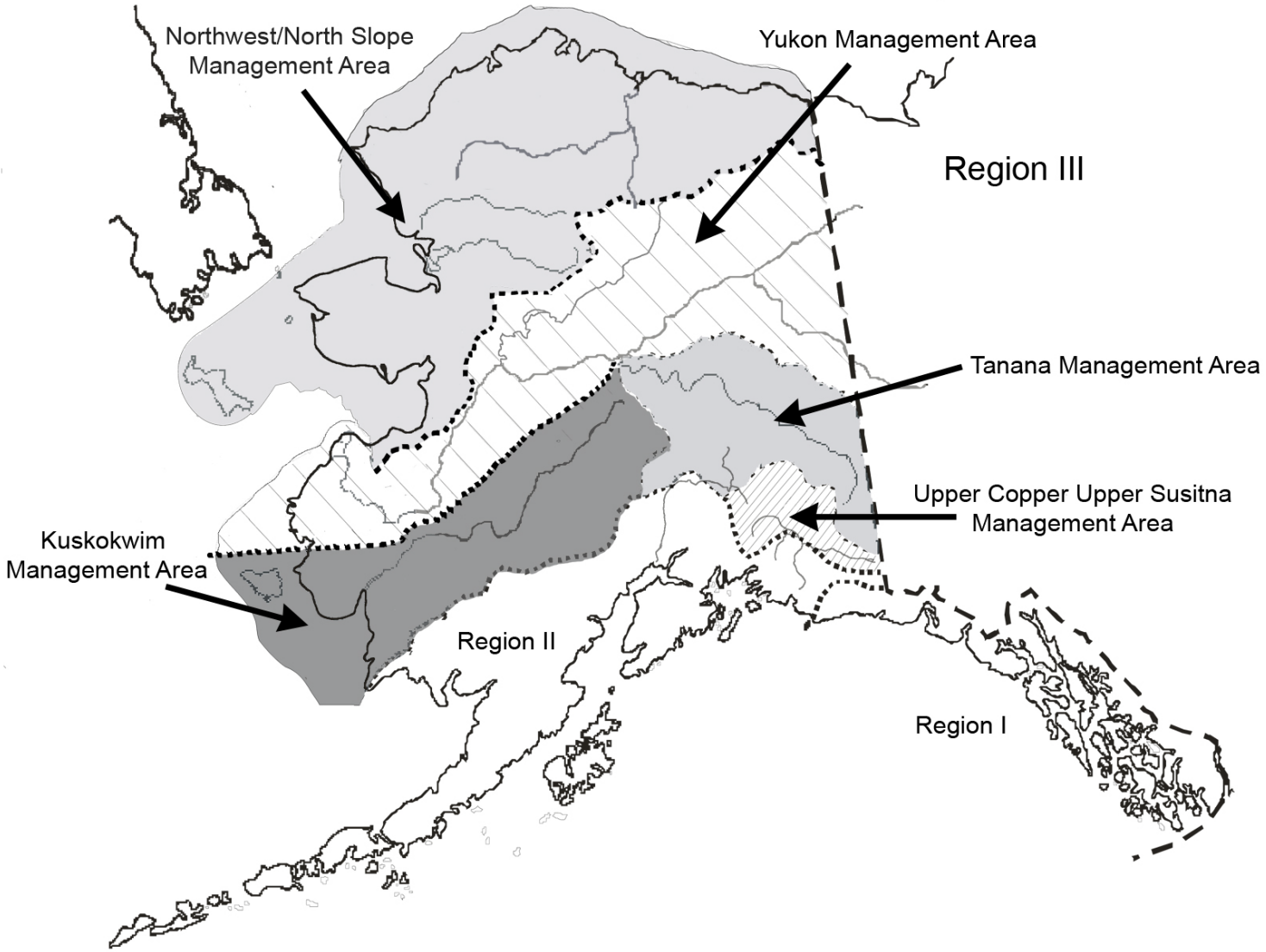

Figure 1.–Map of the sport fish regions in Alaska and the five Region III management areas.

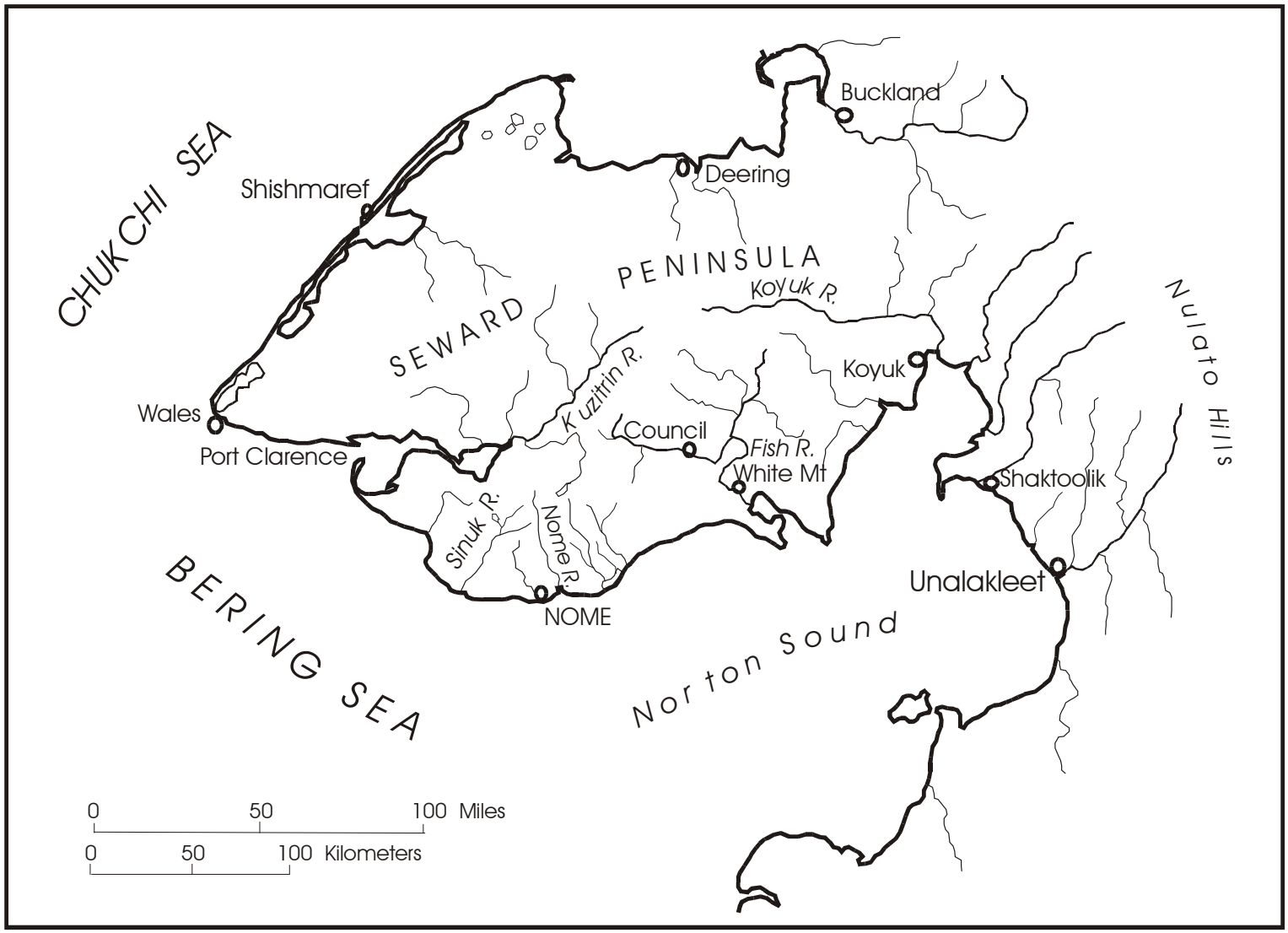

Figure 2.–The Seward Peninsula/Norton Sound subarea.

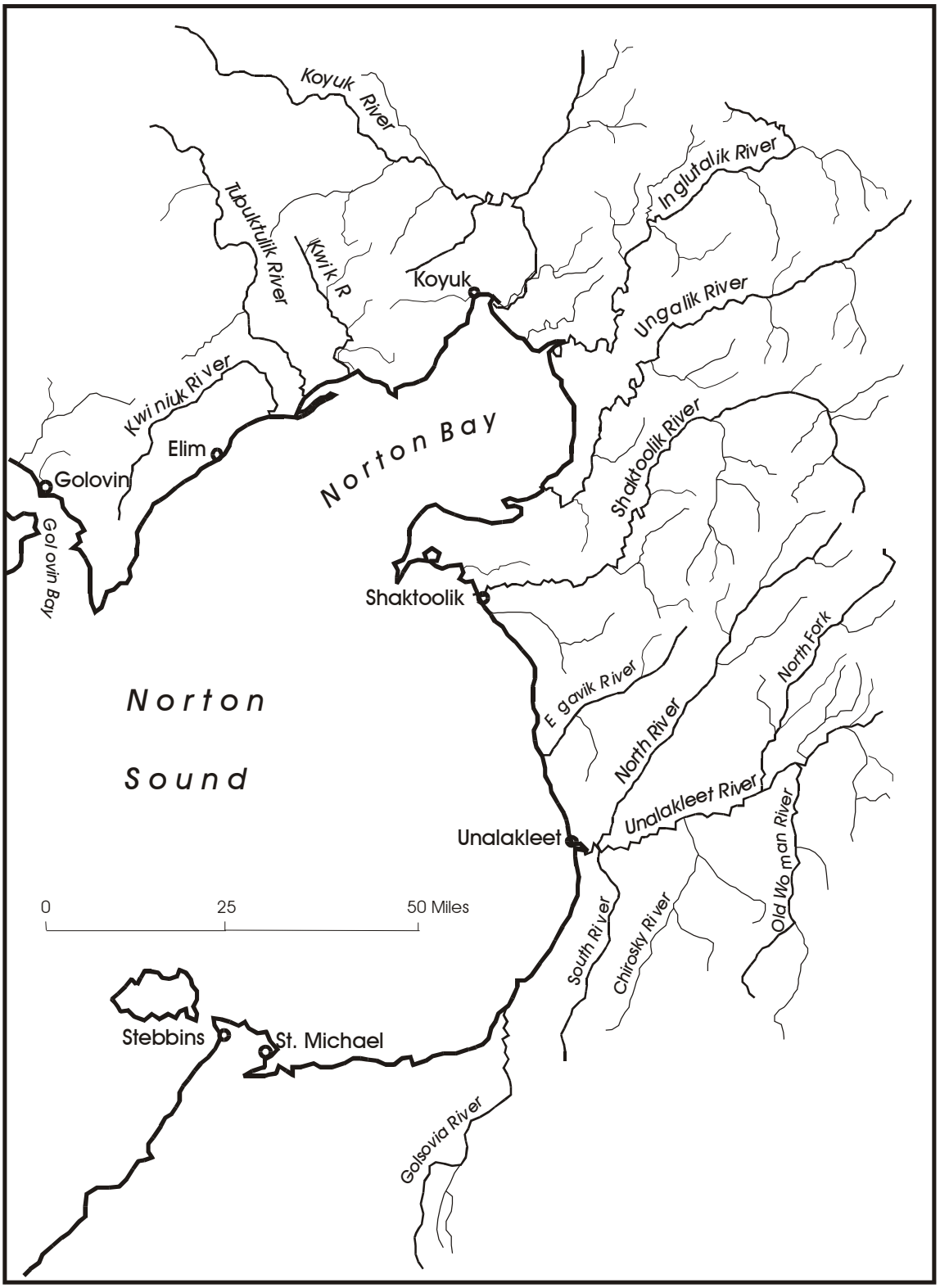

Figure 3.–Major drainages of Southern Norton Sound.

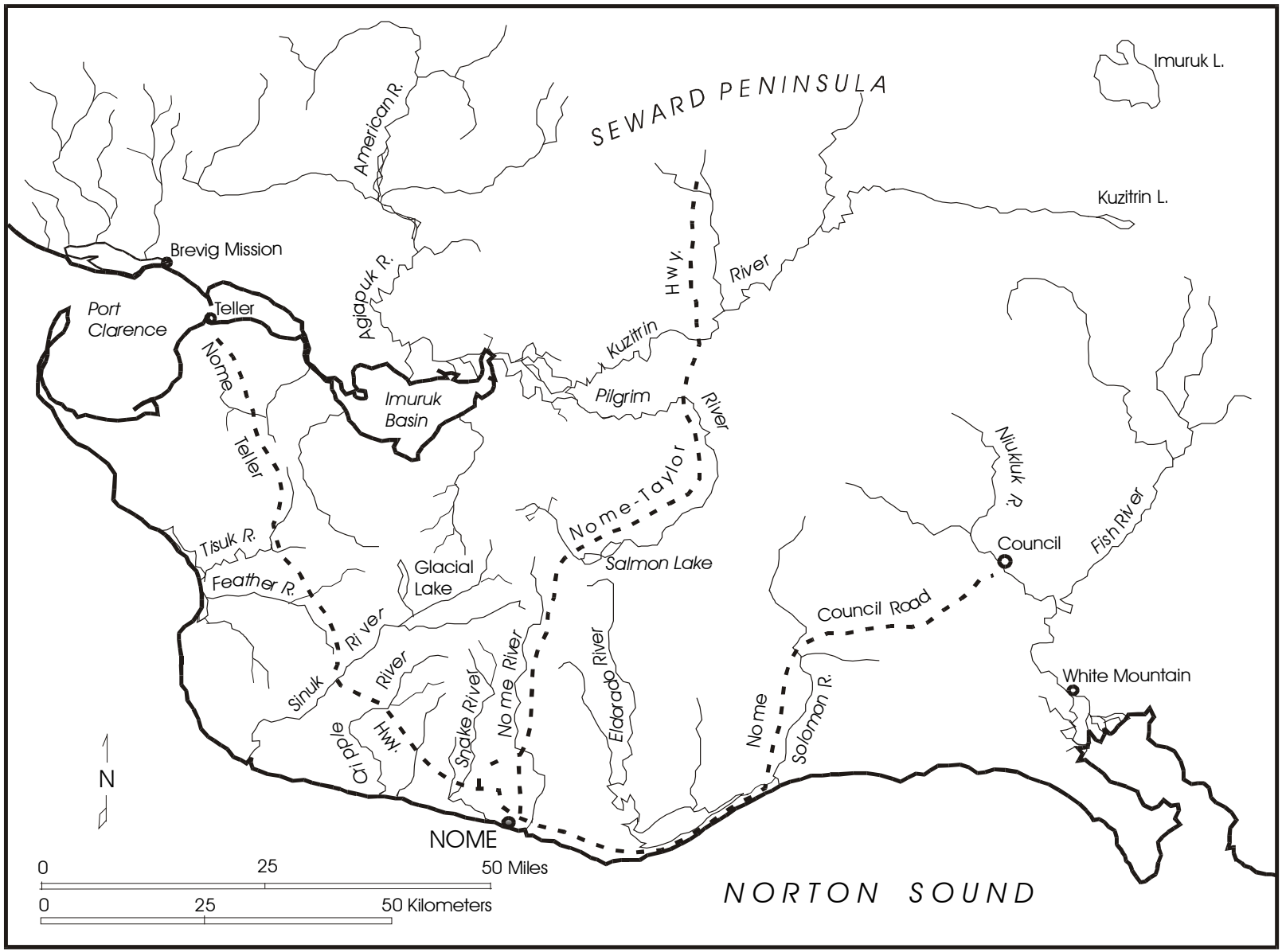

Figure 4.–Southern Seward Peninsula with road accessible waters.

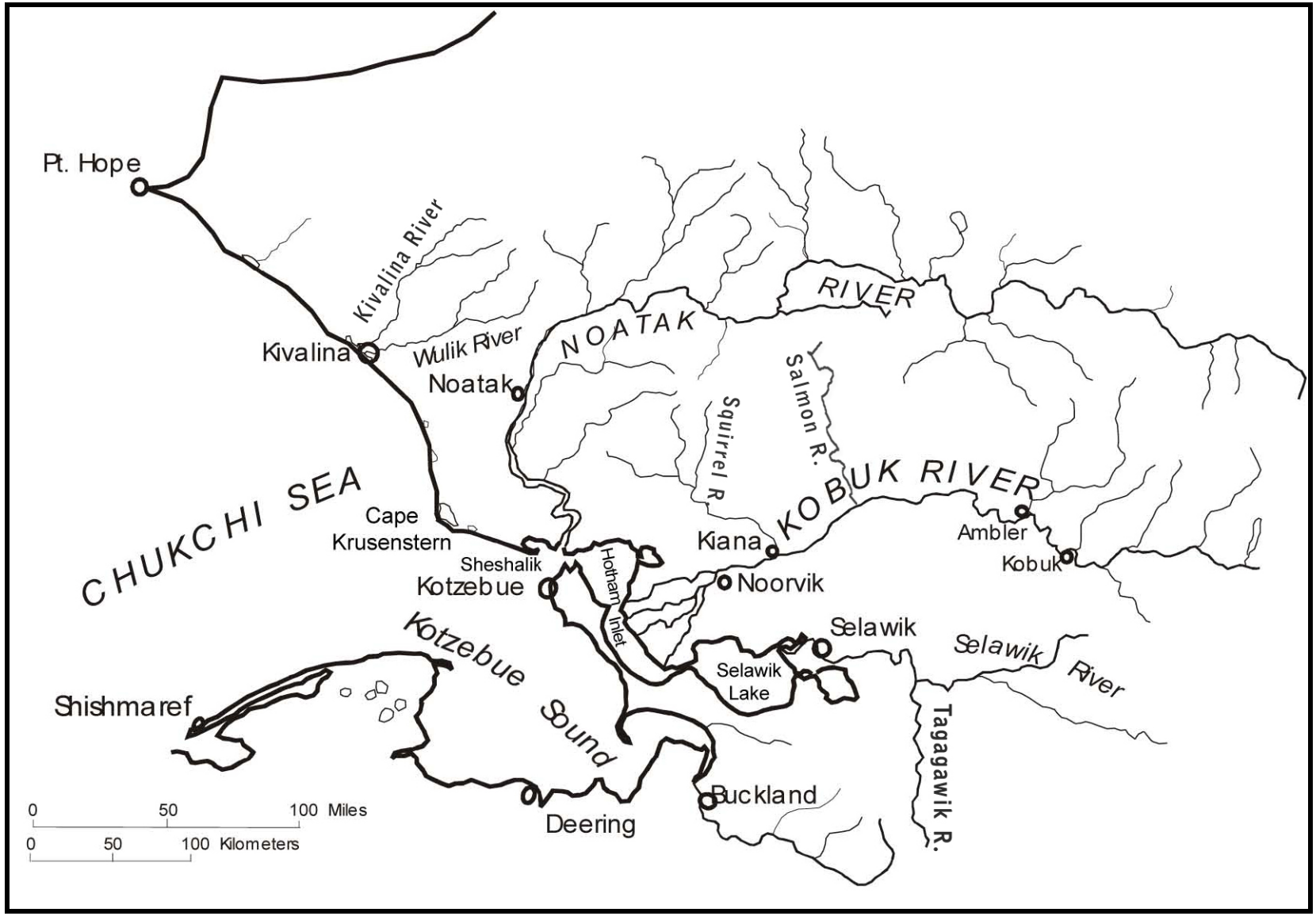

Figure 5.–Kotzebue Sound/Chukchi Sea subarea.

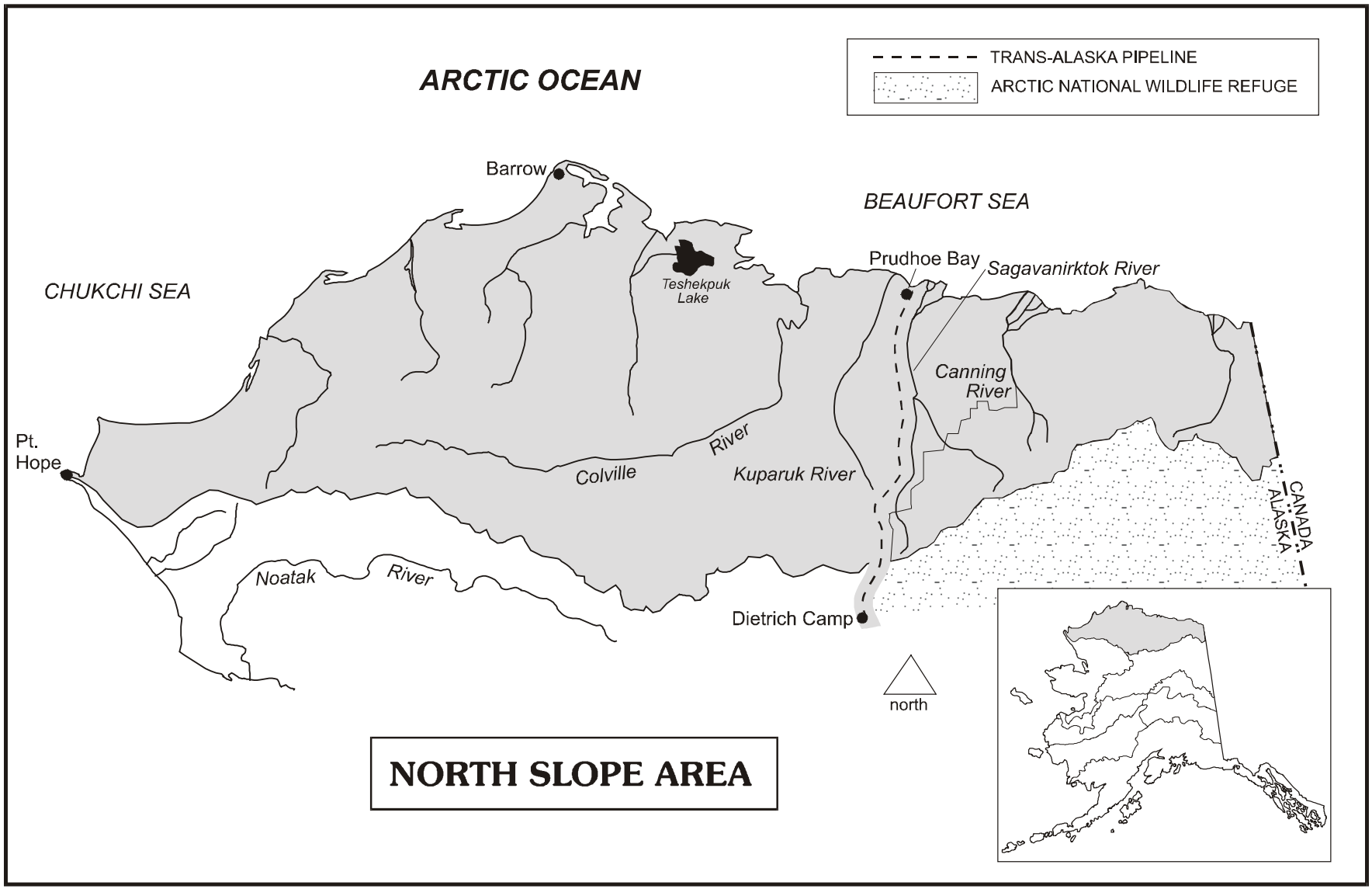

Figure 6.–North Slope subarea.

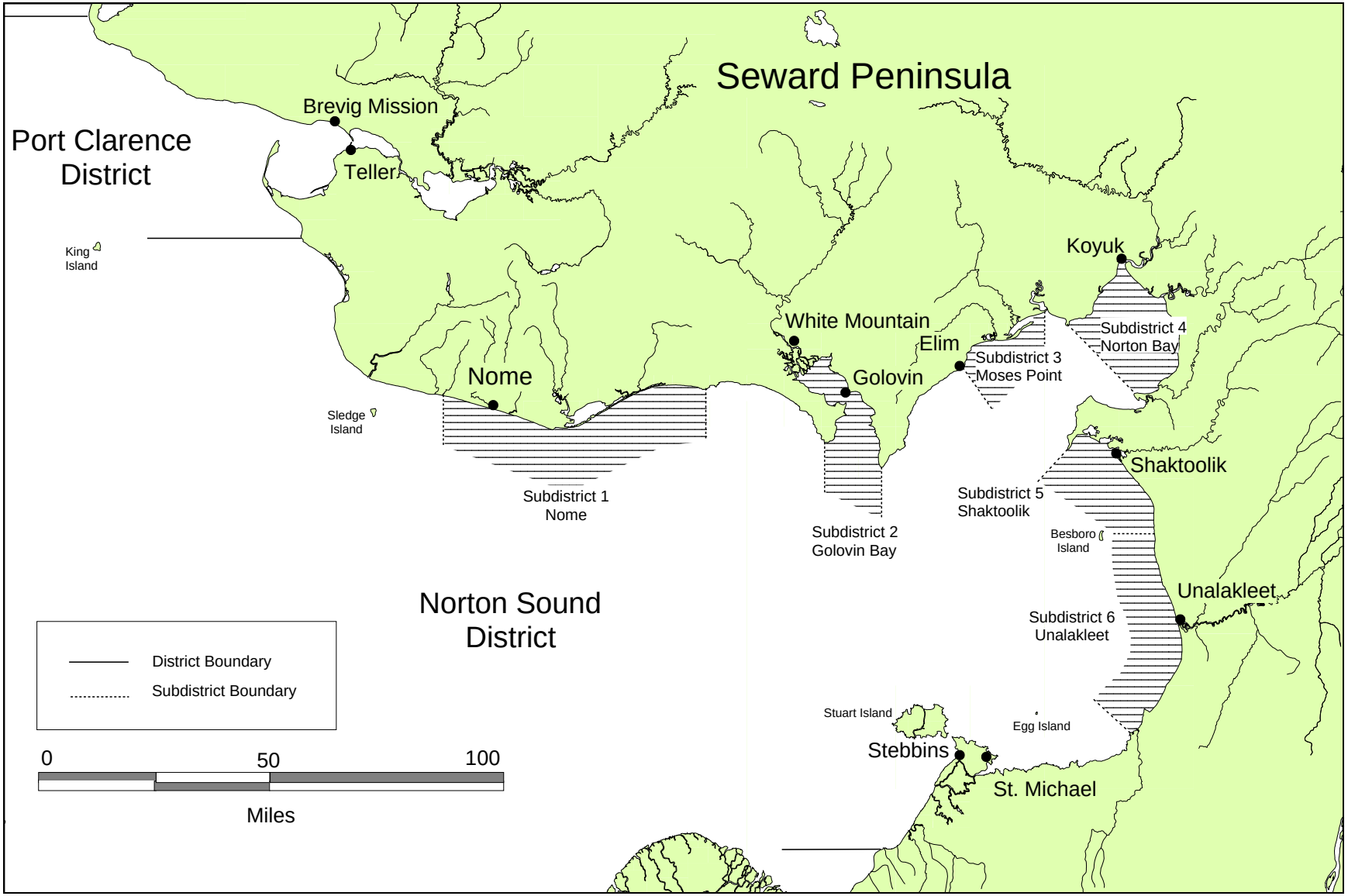

Figure 7.–Commercial salmon fishing subdistricts in Norton Sound and Port Clarence.

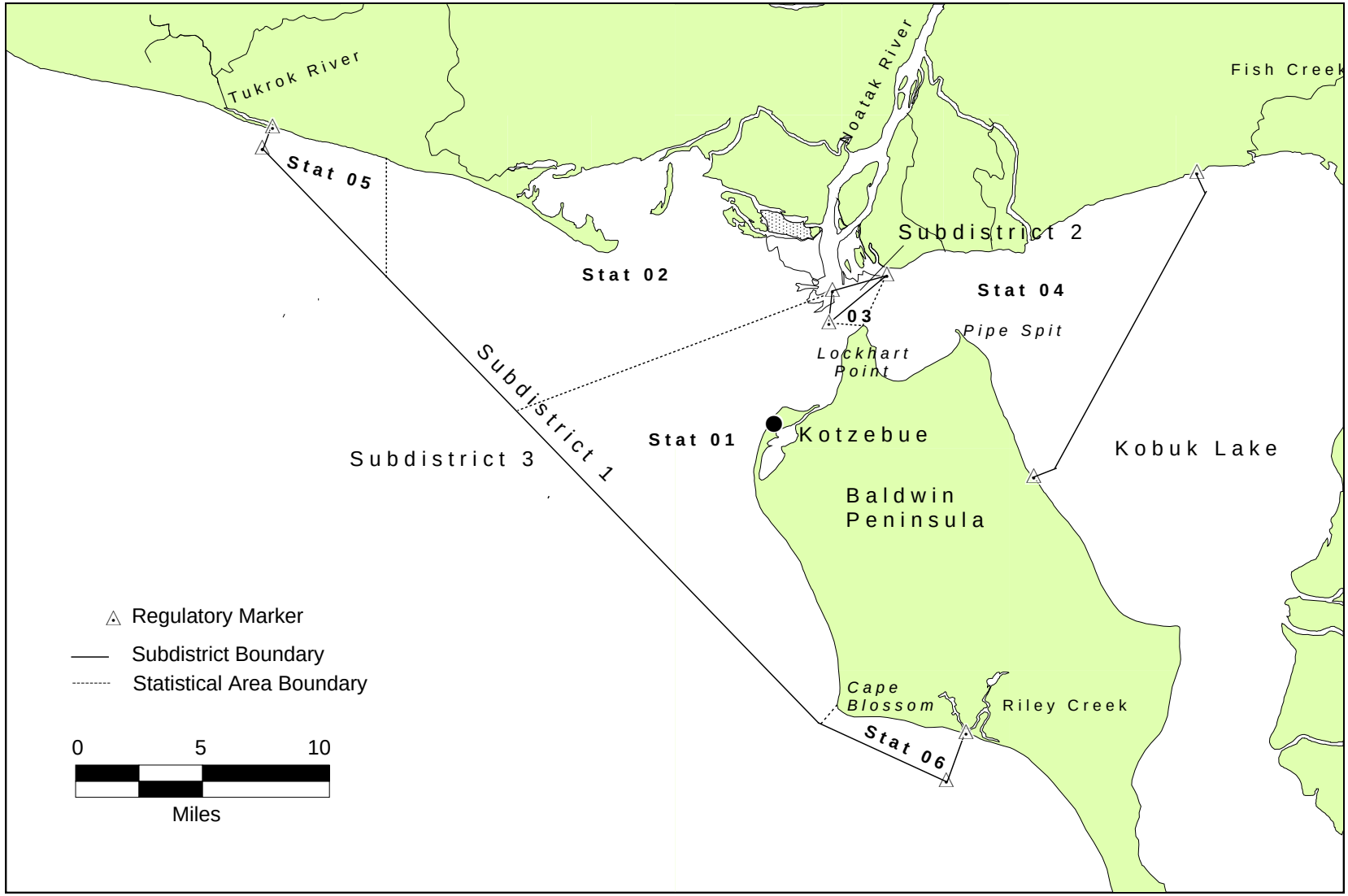

Figure 8.–Kotzebue commercial salmon fishing district.

APPENDIX A
UNALAKLEET RIVER KING SALMON MANAGEMENT PLAN

5 AAC 04.395. Subdistricts 5 and 6 of the Norton Sound District and the Unalakleet River King Salmon Management Plan. (a) The purpose of this management plan is to provide the department management direction for the subsistence, sport, and commercial king salmon fisheries in the marine waters of Subdistricts 5 and 6 and in the Unalakleet River drainage from June 15 through July 15.

(b) From June 15 through June 20,

(1) the commissioner will close, by emergency order, subsistence fishing and immediately reopen subsistence fishing with two 48-hour fishing periods per week in the marine waters of Subdistricts 5 and 6; and two 36-hour fishing periods per week in the inriver fishery;

(2) in the sport fishery,

(A) the bag and possession limit for king salmon is two fish, of which only one fish may be 20 inches or greater in length;

(B) the annual limit for king salmon 20 inches or greater in length is two fish;

(3) commercial fishing is closed.

(c) If the projected escapement is below the lower end of the escapement goal range, all fishing will be closed.

(d) Notwithstanding any provision of 5 AAC 39.222 and 5 AAC 39.223, if the projected king salmon count at the North River counting tower exceeds the midpoint of the escapement goal,

(1) the commissioner may open, by emergency order, a subsistence king salmon fishery in the

(A) marine waters of Subdistricts 5 and 6 for two 48-hour fishing periods per week; and,

(B) inriver fishery for two 36-hour fishing periods per week;

(2) the commissioner may increase, by emergency order, the sport fish annual limit for king salmon, 20 inches or greater in length, to four fish;

(3) the commissioner may open, by emergency order, a commercial king salmon fishery with two 24-hour fishing periods per week.

(e) If subsistence fishing periods in the Unalakleet River drainage are restricted to less than two 36-hour openings, the sport fish harvest annual limit for king salmon will be reduced to one fish with no size limit.

(f) In Subdistricts 5 and 6, if the marine waters subsistence fishery is restricted to less than two 48-hour fishing periods, the sport fishery will be reduced, by emergency order, to catch-and-release fishing only.

(g) In the Unalakleet River drainage or in the marine waters of Subdistricts 5 and 6, if the subsistence fishery is closed to the retention of king salmon, sport fishing for king salmon will be closed. (Eff. 6/7/2007, Register 182)

Authority: AS 16.05.060 AS 16.05.251 AS 16.05.258

APPENDIX B
SPORT FISH EMERGENCY ORDERS ISSUED DURING 2010

Appendix B1.–NW/NSMA sport fish emergency orders issued during 2010.

E.O. Number	Effective Dates	Action
EO-3-KS-02-10	July 8–August 15	Closes sport fishing for king salmon and prohibits the use of bait in the Unalakleet and Shaktoolik river drainages.
EO-3-PS-01-10	July 9–October 15	Increases the sport bag and possession limit for pink salmon to twenty (20) fish in the Nome Subdistrict (all flowing waters between the west bank of the Sinuk River and Topkok Head) and the Golovin Subdistrict (all flowing waters of the Fish River drainage, including the Niukluk and Casadepaga rivers).
EO-3-SS-01-10	August 19–October 15	Increases the sport bag and possession limit for coho salmon to six (6) fish in all waters of the Fish River drainage.

APPENDIX C
ADDRESS AND CONTACT NUMBERS FOR INFORMATION SOURCES REGARDING NW/NSMA

Appendix C1.–Addresses and contact numbers for information sources regarding NW/NSMA.

Organization	Address	Phone	Internet address
Alaska Department of Fish and Game, Nome Area office	PO Box 1148 Nome, AK 99762	(800) 443-5167	www.adfg.alaska.gov/
Fairbanks Regional office	1300 College Road Fairbanks, AK 99701-1599	(907) 459-7207	
Gates of the Arctic National Park and Preserve	PO Box 30 Bettles, AK 99726	(907) 692-5494	www.nps.gov/gaar/
Arctic National Wildlife Refuge	101 12th Avenue, Room 236 Fairbanks, AK 99701	(907) 456-0250	http://arctic.fws.gov/
Bering Land Bridge National Preserve	PO Box 220 Nome, AK 99762	(907) 443-2522	www.nps.gov/bela/
Alaska Maritime National Wildlife Refuge	95 Sterling Highway, Suite 1 MS 505 Homer, Alaska 99603	(907) 235-6546	alaskamaritime.fws.gov/
Noatak National Preserve	PO Box 1029 Kotzebue, AK 99752	(907) 442-3890	www.nps.gov/noat/
Kobuk Valley National Park	PO Box 1029 Kotzebue, AK 99752	(907) 442-3890	www.nps.gov/kova/
Selawik National Wildlife Refuge	PO Box 270 MS 565 Kotzebue, Alaska 99752	(907) 442-3799	www.fws.gov/refuge/selawik/
Cape Krusenstern National Monument	PO Box 1029 Kotzebue, AK 99752	(907) 442-3890	www.nps.gov/cakr
Unalakleet National Wild and Scenic River	222 West 7th Avenue, #13 Anchorage, AK 99513	(907) 271-5477	www.blm.gov/ak/ado/unkriver.html
NANA Regional Corporation	PO Box 49 Kotzebue, AK 99752	(800) 478-3301	www.nana.com/regional
Nome Eskimo Community	PO Box 1090 Nome, Alaska 99762	(907) 443-2246	nomeeskimo@gci.net
Unalakleet IRA Council	PO Box 270 Unalakleet, Alaska 99684	(907) 624-3622	unkira@kawerak.org
Norton Sound Economic Development Corporation	PO Box 358 Nome, AK 99762	(888) 650-2477	www.nsedc.com